SCIENCE

FRIDAY, JANUARY 14, 1898.

CONTENTS:

MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Prof. J. McKeen Cattell, Garrison-on-Hudson, N. Y.

*SOME OF THE FUNCTIONS AND FEATURES OF A BIOLOGICAL STATION.**

I HAVE a few considerations to offer on a subject not quite new, but perhaps not without some interest, to a Society of Naturalists. The subject may be stated in the form of a question: What are some of the more essential functions and features to be represented in a biological station? This question is one that may fairly claim the attention of a society organized for 'the discussion of methods of investigation and instruction, and other topics of interest to investigators and teachers of Natural History; and for the adoption of such measures as shall tend to the advancement and diffusion of the knowledge of Natural History.'

I know of no other organization in this country in which the different sides of biology are more fully and widely represented, and no other in which the discussion of such a question as I have stated has been more explicitly invited.

The question before us, as you perceive, is one of ideals, something which we can construct without the aid of an endowment, and probably without any permanent loss of protoplasm. And yet, what I have in mind is not wholly imaginary, for it has

*Address of the President of the Society of American Naturalists prepared for the Ithaca meeting, 1897, but not delivered, owing to the unavoidable absence of the writer.

some basis in experience and in acquaintance with some of the best models.

Let us, first of all, try to get at some general principle which may serve to guide our judgment of ideals, and by the aid of which we may be able to formulate an answer to the question proposed.

As all will allow, ideals are absolutely indispensable to progress, and always safe provided they are kept growing. Like all biological things, live ideals originate by germination, and their growth is subject to no limit except in mental petrifaction. Growth and adaptability are as natural and necessary to them as to living organisms. Here we have, then, an unfailing test for the soundness or relative merit of ideals. Seeds may be kept for years without sensible change or loss of power to germinate. But it is because they are kept, not planted and cultivated. Once planted, they must grow or rot. So it is with ideals. The unchanged ideal that we sometimes hear boasted of is at best but a dormant germ, not a plant with roots and branches in functional activity. If an ideal stands for anything which is growing and developing, then it must also grow, or be supplanted by one that will grow. It is easy, of course, to conceive of ideals a hundred years or more ahead of possible realization; but such ideals could have no vital connection with present needs, and long before the time of possible realization they would cease to be the best, if the best conceivable at the start.

We are here, then, concerned only with ideals rooted in experience and continually expanding above and in advance of experience. The moment growth ceases, that moment the work of the ideal is done. Something fails at the roots and you have waste mental timber to be cleared away as soon as possible to make room for the new seed.

Let us here take warning of one danger to which we are all liable—the danger of adopting ideals and adhering to them as finalities, forgetting that progress in the model is not only possible, but essential to progress in achievement. The danger is all the greater in the case of ideals lying outside our special field of work, which we are unable to test and improve by our own efforts. The head may thus become stored with a lot of fixed mental furniture, and the possessor become the victim of an illusion, from the charms of which it is difficult to disenchant him. He falls into admiration of his furniture, taking most pride in its unchangeableness. It was, perhaps, the best to be found in the market at the time of installment, and he finds pleasure in the conceit that what *was* the best is and must remain the best. He sees new developments in the market, but his pride and inertia content him with the old. The illusion now takes full possession of him, and every departure from his own ideals seems like abandonment of the higher for the lower standard of excellence. His conceit grows instead of his ideals, and every annual ring added to its thickness renders it the more impervious.

Can any one say he has never met this illusion? Then a warning may have more pertinency than I should have ventured to claim for it.

To conclude these introductory remarks let me again emphasize the all-important qualification of the sound ideal and name the prime condition of its usefulness. The qualification is vitality and the capacity for unlimited growth and development. The condition is absolute freedom for growth in all directions compatible with the symmetrical development of the science as a whole. Please remember that the question of means does not now concern us. We must first get at principles, leaving details of execution to be worked out afterwards in harmony therewith. No one can foresee what means may

be found, and it would be a waste of time to try to decide what should be done under this, that or the other set of conditions. If we know our ideal we know the direction of effort, and through the effort the means are eventually found.

It will help us in the formulation of our ideal if we glance for a moment at the ideals that have found most favor. The best models of marine laboratories ten years ago all agreed in making research the exclusive aim and in limiting the work to marine forms. In most cases the work was still further limited, embracing only marine zoology, and often only a small portion of that field. The idea of representing all branches of even marine biology was seriously entertained nowhere except at Naples. Remembering that marine laboratories were first introduced only about a quarter of a century ago, we are not surprised at these limitations. Even the narrowest limitations were extensions beyond what had been done before. The Naples Station itself began as a zoological station, and still bears the name *Stazione Zoologica*. But the earlier ideal was not long in expanding so as to include both physiology and botany. Will its growth stop there? I don't believe it will, but that remains to be seen.

Our own seaside schools, introduced by Louis Agassiz at Penikese and continued by Professor Hyatt at Annisquam, combined instruction with research, and this plan was adopted at Woods Holl in 1888. Instruction, however, was accepted more as a necessity than as a feature desirable in itself. The older ideal of research alone was still held to be the highest, and by many investigation was regarded as the only legitimate function of a marine laboratory. Poverty compelled us to go beyond that ideal and carry two functions instead of one. The result is that some of us have developed an ideal of still wider scope, while others stand as they began by their first choice.

We have, then, two distinct types of ideals, the one including, the other excluding instruction. One is preferred for being limited to investigation; the other is claimed to be both broader and higher for just the contrary reason, that it is not limited to investigation. At first sight, it might seem that we had exact contraries, but that is really not the case, for one type actually includes the other, and differs from it only by the more which it contains. The difference is, nevertheless, an important one, and as it divides opinion we must examine it.

To my mind, nothing but experience can settle such a question; but if reason and experience coincide, so much the better, so we may consider it from both points of view. On the basis of ten years' experience, and a previous intimate acquaintance with both types, I do not hesitate to say that I am fully converted to the type which links instruction with investigation; and I believe that many, if not most, of my colleagues in the work at Woods Holl, would now concur with me in the opinion that we could not wisely exclude instruction, even if made free to do so by an ample endowment. Some of you will probably feel that such a conclusion implies a step backward rather than forward. On which side is the illusion? Is it with those who have accepted their ideal second-hand and held to it unchanged from the time of its adoption, or with those who have been compelled to develop their own ideal from all that they could learn by actual experiment and study? Which is the broader ideal, and with which are the possibilities for progressive growth least limited?

In what consists the argument for limitation to research? I have yet to learn of a single important advantage which is necessarily dependent upon this limitation. Is instruction a burden to the investigator which interferes with his work? That objection is frequently raised, and it is about

the only one that we need stop to consider here. That instruction interferes with investigation when it is so arranged as to absorb all, or the larger share, of one's time, no one will deny. But is it not easy to so divide the time that the investigator will find rest and improvement from the instruction he gives? Certainly it is possible, as we have fully demonstrated at Woods Holl, and that too with only the most limited means. With a laboratory open throughout the year, the investigators connected with it would scarcely feel a few weeks' instruction as an impediment. Not only have we shown that such an accommodation or adjustment of the functions is possible and tolerable even in our vacations, but we have also learned that there are some important advantages growing out of it which are impossible under limitation to research. To my mind these advantages far outweigh any and all objections.

The advantages I have in mind are not those of means for running the laboratory, which could be supplied by an endowment, but those which add directly to the progress of the investigator and to the advancement of his work. If important advantages exist in connection with instruction even where there is no endowment, which are not available even with an endowment, where instruction is excluded, we can readily make our choice of types.

I suppose no investigator, not even the most confirmed claustrophil, would deny that instruction compels thinking and improves ability to express ideas as well as to describe facts. So does writing, so does investigation itself. True, and if that is to their credit, it must be the same to instruction. But wherein is the advantage with instruction? Every teaching investigator can answer that; and the answer will be, that power of exposition can be acquired and perfected by class-work and lectures to an extent otherwise unattainable. In this we need no better example than Huxley. If rare powers of exposition are sometimes gained without teaching, as in the case of Darwin, that in no way weakens the position here taken, which is that teaching is the most effective method, not the only one, yet an essential one to the highest attainment.

One thing more on this point. Why do we place so high a value on investigation? Because it is the only way of advancing knowledge, and because it affords a most attractive field for the exercise of the mind. But if knowledge needs advancement, so does the investigator, and whatever contributes to the increase and improvement of his powers makes him the better investigator, and thus indirectly raises the quality and augments the quantity of his researches. Herein instruction plays a very important part, as becomes evident when we remember that with increase and specialization in science the investigator himself becomes more and more dependent upon the instruction which he draws not only from books and journals, but also directly from his colleagues and his pupils. Indeed, he may learn in this way much quicker and more thoroughly than by reading, and often a long time in advance of publication. That is an immense advantage realized in a variety of ways, as in lectures giving the more important results of work before publication; in seminar where the results of individual investigators are brought forward and discussed, while the work is still in progress; in journal clubs devoted to reviews and discussions; in direct intercourse with pupils, seeing with their eyes and working with their hands; in daily intercourse of thought and comparison of observations with fellow-workers, etc. Indeed, it may be truly said that no one stands in such close and pressing need of continual instruction as the investigator. No one else absorbs it more eagerly and

copiously, and no one else can convert it so directly into the results of research.

Another advantage supplied by instruction must be mentioned here, for in it I see opportunities for development of far-reaching importance to research. It is lamentable to see so much energy available for research lost or ineffective for lack of proper directive coördination. The avalanche of modern biological literature consists too largely of scrappy, fragmentary, disconnected products of a multitude of investigators, all working as so many independent individuals, each snatching whatever and wherever he can, and then dumping his heterogeneous contributions into the common hodge-podge. How are we ever to extricate ourselves from such appalling confusion? The ambition to be prolific rather than sound is a peril against which we seem to have no protection at present. And yet, if I mistake not, there is a growing sentiment against such traffic in science, which will eventually make it plain that ambition in that direction spends itself in vain. A dozen or more dumps a year, with as many or more retractions, corrections and supplements, is only a modest-sized ambition. Conclusions are palmed upon the unsuspecting reader, and then, without compunction or apology, reversed from day to day or from month to month, or, worse still, in an appendix subjoined, so that it may be seen how little it costs to be prolific when one day's work cancels another.

It behooves us to find effective remedies as rapidly as possible. The correction would be complete if each worker could bridle his lust for notoriety and take the lesson of Darwin's industry and reservation into his laboratory and study. The outlook for such a millennial dispensation is not very hopeful, and our resources are few and very inadequate, but all the more deserving of attention. The great need is *long-continued*, *concentrated* and *coördinated* work. In a laboratory which draws beginners in investigation in considerable numbers it is possible to assign problems in such a way that the participants may work in coördinate groups, and the problems be carried on from year to year, and from worker to worker, each performing his mite in conjunction and relation with the others of his group. In this way energy would be utilized to the greatest advantage to science as well as to the individual. Even under the very imperfect conditions represented at Woods Holl, I have found it possible to put this idea into practice to some extent, and I have great faith in its efficacy. Herein we see another possibility of development realizable only through instruction.

But it is as important for independent investigators as for beginners to cultivate organic unity in their work. How shall the investigator hope to keep in touch with the multiplying specialities of his science? Here, again, I maintain that instruction is an indispensable means. Fill a laboratory with investigators and, if no instruction is provided, many of the more important avenues of acquisition will be closed and the opportunities for coördination of work will be of little or no avail. Investigators might work for months in adjoining rooms and never learn anything about each other's work, as every one knows who has worked in such a laboratory. How different in a laboratory, where instruction is so arranged as, without over-taxing any one, to bring the workers into active and mutually helpful relations, and enable them to draw from one another the best that each can give! Instruction in the various forms before indicated supplies just the conditions most favorable to interchange of thought and suggestion. It is just this feature of our work at Woods Holl to which we are most indebted for whatever success we have had.

I am aware that other points might be raised; but it is far from my purpose to run down all possible objections. It is enough to have indicated the grounds of my choice of types. It now remains to briefly sketch the general character and to emphasize some of the leading features to be represented in a biological station.

The first requisite is capacity for growth in all directions consistent with the symmetrical development of biology as a whole. The second requisite is the union of the two functions, research and instruction, in such relations as will best hold the work and the workers in the natural coördination essential to scientific progress and to individual development. It is on this basis that I would construct the ideal and test every practical issue.

A scheme that excludes all limitations except such as nature prescribes is just broad enough to take in the science, and that does not strike me as at all extravagant or even as exceeding by a hair's breadth the essentials. Whoever feels it an advantage to be fettered by self-imposed limitations will part company with us here. If any one is troubled with the question: Of what use is an ideal too large to be realized? I will answer at once. It is the merit of this ideal that it can be realized just as every sound ideal can be realized, only by gradual growth. An ideal that could be realized all at once would exclude growth and leave nothing to be done but to work on in grooves. That is precisely the danger we are seeking to avoid.

The two fundamental requisites which I have just defined scarcely need any amplification. Their implications, however, are far-reaching, and I may, therefore, point out a little more explicitly what is involved. I have made use of the term '*biological station*' in preference to those in more common use, for the reason that my ideal rejects every artificial limitation that might check growth or force a one-sided development. I have in mind, then, not a station devoted exclusively to zoology, or exclusively to botany, or exclusively to physiology; not a station limited to the study of marine plants and animals; not a lacustral station dealing only with land and fresh-water faunas and floras; not a station limited to experimental work, but a genuine biological station, embracing all these important divisions, absolutely free of every artificial restriction.

Now, that is a scheme that can grow just as fast as biology grows, and I am of the opinion that nothing short of it could ever adequately represent a national center of instruction and research in biology. Vast as the scheme is, at least in its possibilities, it is a true germ, all the principal parts of which could be realized in respectable beginnings in a very few years and at no enormous expense. With scarcely anything beyond our hands to work with, we have already succeeded in getting zoology and botany well started at Woods Holl, and physiology is ready to follow.

If, now, experimental biology could be started, even in a modest way, it would add immensely to the general attractions of our work; for it would open a field which is comparatively new and of rapidly growing importance. There are so many things now called 'experimental' that I must explain what I have in mind sufficiently to make the general purpose intelligible.

It is not the experimental embryology redundantly described as 'developmental mechanics' which is now in vogue; not laboratory physiology, even in its wider application to animals; not egg-shaking, heteromorphism, heliotropism and the like —not any of these things, but experimental natural history, or biology, in its more general and comprehensive sense. It is not the natural history of the tourist, or the museum collector, or the systematist, but

the modern natural history, for which Darwin laid the foundation, and which Semper, Romanes, Galton, Weismann, Varigny, Lloyd Morgan and others have advocated and practiced to the extent of the meager means at their command. The plan which I should propose, however, has not, so far as I am aware, been definitely formulated by any one, although some of its features were indicated several years ago, when I proposed such a station in connection with the University of Chicago. The essentials of the plan were sketched as follows:

"Experimental biology represents not only an extension of physiological inquiry into all provinces of life, but also the application of its methods to morphological problems—in short, it covers the whole field in which physiology and morphology can work best hand in hand. * * *

"A lake biological station equipped for experimental work would mark a new departure for which science is now ripe. Such a station has nowhere been provided, but its need has been felt and acknowledged by the foremost biologists of to-day. There are no problems in the whole range of biology of higher scientific interest or deeper practical import to humanity than those which center in variation and heredity. For the solution of these problems, and a thousand others that turn upon them, facilities for *long-continued experimental study, under conditions that admit of perfect control, must be provided.* Such facilities imply, first of all, material for study, and that nature here supplies in rich abundance. Then a convenient observatory, with a scientific staff, is required. In addition, and this is all-important, there should be not only aquaria and plenty of running water, but also a number of ponds with a continuous supply of water, so arranged that the forms under observation could be bred and reared in isolation when necessary. Finally, there should be room for keeping land animals and plants under favorable conditions for cultivation and study. A station with such facilities as have been briefly indicated would furnish ideal conditions for the prosecution of research in nearly every department of biology, and especially in embryology and physiology." *

If such a station could be developed in immediate connection with the plant already under way at Woods Holl we might begin to realize what a biological station stands for.

We need to get more deeply saturated with the meaning of the word 'biological,' and to keep renewing our faith in it as a governing conception. Our centrifugal specialties have no justification except in the *ensemble*, and each one of them is prolific in grotesque absurdities, for which there is no correction in disconnection with the organic whole. But why talk of an organic whole which no man can grasp or make any pretension to mastering? Precisely that makes it necessary to talk and act as if we knew the fact, and as if our inability had not rendered us insensible to our need. Physiology is meaningless without morphology, and morphology equally so without physiology. Both find their meaning in biology, and in nothing less. What an absurdity was human anatomy without comparative anatomy, and comparative anatomy was only a much bigger absurdity until the general connection of things began to dawn in the conceptions of biology. Just think of a physiologist seriously proclaiming to the world that instinct reduces itself in the last analysis to heliotropism, stereotropism and the like. The whole course of evolution drops out of sight altogether, and things are explained as if the organic world were a chemical creation only a few hours old. The absurdity is no greater than for a geologist to

* Program of Courses in Biology, Chicago, 1892.

try to explain the earth without reference to its past history.

Think of a young morphologist, with all the advantages of the Naples Station at hand—yes, within the walls of that grand station—loudly sneering at Darwinism, and spending his wit in derisive caricatures of general truths beyond the horizon of his special work and thought. And shall we forget the physiologist whose philosopher's stone is the search for his ancestry among the Arachnids? Or the anatomist who reverses his telescope to discover that his science begins and ends in terminology? And could we, much as we might yearn for such a benediction, forget the omnipresent and omniscient systematist whose creed is summed up in priority?

The catholicon for crankiness has not yet been found, but in science there is but one cure where cure is possible; it is exposure to the full and direct rays of the system as a whole. The application to the subject in hand is patent. The one great charm of a biological station must be the fullness with which it represents the biological system. Its power and efficacy diminish in geometrical ratio with every source of light excluded.

My plea, then, is for a biological station, and I believe that experimental biology would be the most important element in such a station. It is now possible to procure a favorable site, with land and fresh-water privileges, in close proximity with the Marine Biological Laboratory; and with a moderate foundation to start with, the work could begin at any moment.

The project is certainly one of preëminent importance, and for a successful undertaking of that magnitude we need the coöperation of American naturalists. I bring the suggestion before you in the hope that it will enlist your interest and support.

C. O. Whitman.

RECENT PROGRESS IN AGRICULTURAL CHEMISTRY.

II.

The methods of the chemical changes produced in the growth of plants have recently received an admirable study at the hands of Green. (Journal of the Royal Agricultural Society of England, Vol. 6, third series, part 4, pp. 635 *et seq.*) The chief object of Green's study is the reserve food materials of plants, but in conducting these investigations he studies carefully the chemical action on which the plant metabolism is based. The apparatus of the plant, which is active in vegetable metabolism, was studied microscopically and fully illustrated by drawings.

The source of chemical activity in plants is confined to certain small bodies which are imbedded in the layer of protoplasm or living substance which lines the cells of the plants. These small bodies are called chloroplastids or chlorophyll corpuscles, and it is to them that we must look for the actual constructive activity. These are comprised essentially of small masses of protoplasm which have a loose or spongy arrangement of particles forming a complicated mesh work. In the meshes of this spongy mass the green color known as chlorophyll is found. It exists principally in solution. The work which is done by the chloroplastid is very complex, but it is possible to distinguish to a considerable extent between the part played by the green coloring matter itself and that which is discharged by its protoplasmic framework. On account of the character of this material the air has ready access to the interior tissues of the leaf. It enters at the stomata and fills the intercellular spaces. This air contains the small quantity of carbon dioxid which is the fundamental material of plant metabolism. The water which is taken in by the rootlets of the plant contains various mineral and nitrogenous matters in solu-

tion and is conducted directly to the leaf by means of the circulation of the plant itself. This water, the mineral and nitrogenous matters which it contains in solution, and the carbon dioxid which enters from the air, are the raw materials which by plant metabolism are changed into the tissues of the living vegetable.

The source of energy, by means of which this wonderful chemical synthesis is produced, is the heat and light coming from the sun. Green is of the opinion that formaldehyd is one of the first products of the condensation of the carbon dioxid, but as formaldehyd is essentially a poison and a preservative it is not probable that its existence is more than momentary. It may be that formaldehyd is one of the transitory products of vegetable metabolism, but it cannot be regarded as being produced in any considerable quantities or existing for any length of time.

The final and possibly the direct product of the condensation is some form of sugar. The production of these reserve stores of food, viz., carbohydrates, proteids and fats in quantities largely in excess of those necessary for the growth of the plant itself are fully discussed, and the very latest views concerning the methods of storage and subsequent use of these materials clearly pointed out.

Investigations of marked interest have lately been conducted on the properties and functions of humus. Hilgard has shown that the nitrogen content of humus found in the soil of the California Agricultural Experiment Station is as much as 18 per cent. in the virgin state. The content of nitrogen in the humus by after years' culture was reduced from 18 to 3 per cent. In the meanwhile, however, the total percentage of humus in the soil had slightly increased.

The obvious conclusion to be drawn from these researches is that the fertility of a soil, in respect of its humus, does not depend so much on the actual percentage of humus itself as upon the nitrogen content therein. When a plant, therefore, gives evidence of nitrogen hunger it is not always due to a deficiency of humus, but probably rather to the diminution of the nitrogen content of the humus.

A more striking example came to Hilgard's attention in a soil from Hawaii, which, after three years of cultivation, gave evidence of marked deficiency in the nitrogen ration of the plant. The virgin soil showed a content of 10 per cent. of humus, which is far above the average of even fertile soils. On analysis, however, it was found that the nitrogen content of the humus had been reduced to 1.7 per cent. It is concluded from the observations of the deportment of crops on soils of this kind that wherever the nitrogen in the humus of the soil falls below 2.5 per cent. of the total weight of the humus the crop will show evidences of nitrogen hunger.

Snyder has shown that in sterilized sand oats will not grow when fed with humus in which no nitrifying ferments are present. If, however, the nitrifying ferments be added in the form of leachings from an arable soil the oats will grow and develop in the usual manner.

Snyder has also shown, as a result of his investigations, that humus acts not only in supplying the elements of fertility, but also in combining with mineral matters, especially potash, producing in the soil potassium humates and rendering the potash thus more easily assimilable. In other words, the humus acts in a favorable manner by converting the inert plant food of the soil into a form in which it can be absorbed. The experiments in sterilized pots show that the humates of potassium, magnesium and iron and the double humates of phosphorus and sulfur can be utilized directly as plant food, provided nitrifying

organisms be present. (Bulletin Minn. Agr. Exp. Sta. No. 41.)

The remarkable property of vegetable soils, consisting largely of humus, in increasing the nitrogen of a cereal crop, has been noticed in the experiments of the Chemical Division of the Department of Agriculture at Washington. In three successive years roots growing in a vegetable soil from Florida have shown an increased percentage of nitrogen as compared with roots grown in the same conditions in typical arable soils. The increase in nitrogen content has, in some instances, been as high as 30 per cent. in a whole crop.

An examination of the character of the nitrogen-content of the soil shows that this increase is largely in the form of amid nitrogen.

I have frequently noticed in Florida the mechanical absorption of humus by a plant in the case of sugar cane grown upon the peaty soils. The juices of these canes often have a distinct brown color which is characteristic of water which has passed through a soil of this nature. The sugar which is made from these canes does not have the bright crystalline appearance of ordinary sugars made from cane, but has a brownish tint difficult to remove even when the sugars are of a high degree of purity.

There is no doubt whatever of the fact that the liquid absorbed by the plant rootlets carries mechanically in solution particles of humus to all parts of the plant.

It thus appears that humus has a more direct use as a plant food than has been supposed by those who adopted *in toto* the mineral theory of Liebig, and this is shown by its nitrogen content, as studied by Hilgard; by the action of humates in supporting plant life, as investigated by Snyder, and by the actual increase in the content of nitrogen in plants, grown upon peaty soils, noticed in our own experiments.

It has been generally supposed by agricultural investigators that the acidity of a soil injurious to crops is found only in peaty or marshy soils. This idea has been found to be incorrect by the investigations of Wheeler, which have shown that many of the soils of Rhode Island, not subjected to overflow nor in any sense marshy or peaty, are so acid as to prevent the proper growth of crops. These soils are not particularly deficient in plant food, but ordinary crops fail to flourish when planted therein. The simple application of lime, in sufficient quantities to correct the acidity of the soil, is enough to convert those almost barren fields into highly productive areas.

The difficulty of estimating properly the acidity of the soil has been the chief obstacle in the way of a more thorough investigation of this subject. The acid reaction of peaty soils, as well as all others, is due, as a rule, to the presence of free humic acid or of acid humates. The exhaustion of the soil in any way for the determination of the moisture in the filtrate obtained gives imperfect and unsatisfactory results. In the titration of the extracts obtained the processes which are used in the saturation may act upon the humus bodies, decomposing them and producing fresh portions of humic acid and thus increasing the apparent acidity. This goes on with especial vigor in the presence of free oxygen.

To avoid this difficulty, Tacke has devised a method of determining the acidity in an environment free of oxygen. The essential principle of the apparatus is in having a flask, from which the air can be removed by any convenient method, preferably by a stream of hydrogen, so arranged that when the oxygen is entirely eliminated precipitated carbonate of lime, suspended in water free of oxygen, can be introduced and brought in contact with the finely divided peat or soil. In this way the decomposition of the finely divided calcium carbonate can only be effected by the

free acid or acid humates already formed, and no humus in the absence of oxygen can be converted into an acid and thus increase the amount of carbon dioxid evolved. The quantity of carbon dioxid evolved is estimated by the usual methods and thus an exact measure of the total acidity is secured. (Chemiker-Zeitung, March, 1897, p. 174.)

The claim has been repeatedly made that soda can replace potash to a certain extent in plant growth. The physical and chemical similarity between these two substances is so great that it would not be surprising to find also a physiological resemblance. Wagner, in fact, claims to have demonstrated that a slightly less quantity of potash is needed for plant growth, provided abundant supplies of sodium are present. These deductions of Wagner, however, have not been confirmed by other experimenters. When good effects have followed the application of soda it has been demonstrated that it is due to other causes than the replacement of potash in plant tissues. Soda in certain circumstances may act happily on inert plant food in the soil and render it assimilable. In this respect it doubtless can assist greatly in plant growth. In respect of the mineral food of plants it may be said that it appears to be of two kinds: First, the minerals which are essential, such as phosphoric acid, potash, lime and magnesia. A certain quantity of these mineral substances seem to be necessary for the production of a given quantity of dry plant tissue. But plants have also a general appetite for mineral substances, eating freely in addition to the quantity necessary to their proper nutrition. The exact physiological function of this excess of mineral food cannot be determined, and it is probable that it is largely accidental. Nevertheless, recent investigations have shown that plants thrive best where mineral food, even when non-essential, is liberally supplied, and in these cases soda doubtless plays its part, together with other non-essential matter.

In the light of our present knowledge, however, it must be denied that soda can, in any essential way, replace potash in plant growth.

In a recent re-study of the proteids of the maize kernel, Osborne has brought practically to a close his interesting and valuable contributions to our knowledge of the proteid matters existing in many common cereals. In a sample of yellow maize meal he finds 3.15 per cent. of a proteid soluble in a 0.2 per cent. solution of potash. This proteid contains 15.82 per cent. of nitrogen. The quantity of zein is 5 per cent., containing 16.32 per cent. of nitrogen. These two proteids comprise almost the whole of the proteid matter in the maize. In addition to these, there are minute quantities of edestin containing 18.10 per cent. of nitrogen; a globulin, containing 15.25 per cent. of nitrogen, and a proteose, containing 17 per cent. of nitrogen. Maysin exists to the extent of one-quarter of one per cent. and contains 16.70 per cent. of nitrogen.

As a result of all the determinations, it appears that the mean percentage of nitrogen in the proteids of maize is 16.057.

The proper factor for the multiplication of proteid nitrogen to determine the total weight of proteids in maize is, therefore, 6.22. This is so near the common factor of 6.25 as to make practically little difference in the statement of results. The factors by which nitrogen should be multiplied in order to obtain the weights of proteids in common cereals are: for wheat, 5.70; rye, 5.62; maize, 6.22; oats, 6.06, and barley, 5.82. This revision of the factors for determining the total amount of proteid matter is not only important as regards this matter itself, but also affects the number for the determination of the carbohy-

drates, which is usually made by difference. Agricultural analysts hereafter should use the factors mentioned instead of the common factor 6.25, which has been so long employed.

The use of the basic bessemer process for the manufacture of steel from phosphoriferous pig iron has not yet been fully established in this country. The agricultural importance of this branch of manufacture is found in the production of basic phosphatic slags. In Europe this industry has grown to an enormous magnitude, and it is estimated that at the present time the rate of production in that country is a million and a-half tons of basic slag annually. All this material has found a ready market in the fertilizer trade, and the result has been a corresponding depression in the prices of superphosphates.

The methods of valuing the fertilizing properties of basic slag have lately been worked out very thoroughly in different localities in this and other countries. The difficulties attending the solution of the phosphoric acid in acid ammonium citrate are found chiefly in the varying quantities of uncombined lime which the slags contain. This subject was introduced at the last meeting of the Association of Official Agricultural Chemists, but the discussion was only of a formal nature, it having been relegated to the next meeting.

In addition to the chemical methods of analysis the separation of the slags into silts of different magnitudes will probably prove of use. This cannot be accomplished by subsidence in water, on account of the solvent action of the water on the quicklime present. The substitution of alcohol of appropriate strength, however, obviates this difficulty and renders the mechanical separation of the slags easy of accomplishment.

In this country basic slags have been manufactured only at Pottstown, Pa., and at Troy, N. Y. I visited a large factory at Troy last winter, which was then in full action, but I believe it has been shut down on account of the low price of steel billets. It is believed, however, that a vast quantity of phosphatic iron ores will soon be brought into the market in this country and that the by-product, basic slags, will find a ready agricultural use.

Experience has shown that these slags act happily on sandy soils, and, in fact, in most cases can replace the acid phosphates where phosphoric acid is indicated in the application of fertilizers. The association of agriculture and manufacture in this respect cannot fail to be of value, and it may soon be possible to offer to the farmer available phosphoric acid, in the form of basic slags, at a lower price than can be profitably asked for acid phosphates.

In terminating this brief review of recent progress in agricultural chemistry, I am as fully aware as any of you of the imperfect nature of the *résumé* which has been given. I was not asked, however, until a short time ago to prepare this paper, and have been compelled to gather the information by piecemeal and in the intervals of other pressing duties. I am certain that in my hurry I have omitted many points of progress made by our own investigators which ought to have been incorporated in the paper. I only hope that the one who is next called upon to present a *résumé* of this progress may be given a longer time in which to prepare for his duties.

H. W. Wiley.

Department of Agriculture,
Washington, D. C.

THE MONTREAL MEETING OF THE GEOLOGICAL SOCIETY OF AMERICA.

I.

The Geological Society of America assembled in Montreal, December 28th, for its

tenth annual meeting. The Council met at 10 a. m. and performed the usual routine business of canvassing the votes for officers and new members and the reports of the Secretary, the Treasurer and the Editor. The Society held its first formal session at 2:30 p. m. in the lecture room of the Peter Redpath Museum of McGill University. This is the lecture room in which for so many years Sir J. William Dawson, past President of the Society, delivered his lectures, and it was felt by all present to be peculiarly appropriate that the Society should gather within its walls. One of the first proceedings was to send a greeting to Sir William, who was prevented by illness from being present.

A cordial address of welcome was presented by George Hague, Esq., of the Board of Governors of McGill University, who happily referred to the ties that unite men of science and that recognize no political boundaries. President Orton, of the Society, returned a felicitous response to the address of welcome, after which the report of the Council was distributed in printed form. This showed the Society to be in a very prosperous condition. There are 242 members on the roll, which with the four elected at the meeting make a total of 246. As will readily appear, this number embraces practically all the geological workers in North America. The *Bulletin*, the published proceedings of the Society, is meeting with a gratifying sale outside of the active members. From this source the past year $772.05 were realized, which defrayed about half the expense of publication. The Society has an invested fund of $3,000, and closed the fiscal year November 30, 1897, with a further balance in the Treasurer's hands. This will make possible the more elaborate illustration of future papers. The Society has now a valuable library from exchanges, and this year added a librarian, Professor H. P. Cushing, of Adelbert College, Cleveland, to its list of officers. The library is placed in Cleveland, which is a central point as regards the membership.

When the vote was declared, the following nominees were announced as elected by an almost unanimous ballot:

President: JOHN J. STEVENSON, New York City.
First Vice-President: BENJ. K. EMERSON, Amherst, Mass.
Second Vice-President: GEORGE M. DAWSON, Ottawa, Ont.
Secretary: H. L. FAIRCHILD, Rochester, N. Y.
Treasurer: I. C. WHITE, Morgantown, W. Va.
Editor: J. STANLEY-BROWN, Washington, D. C.
Councillors: W. M. DAVIS (for unexpired term of B. K. Emerson), ROBERT BELL, Ottawa, Ont.; M. E. WADSWORTH, Houghton, Mich.

John M. Clarke, of Albany; George L. Collie, of Beloit; Arthur M. Miller, of Lexington, Ky., and James E. Talmage, of Salt Lake City, were elected Fellows. Two proposed amendments to the constitution were carried. Professor W. B. Scott delivered an appreciative and impressive memorial of Edward D. Cope; and one of Joseph F. James, prepared by T. W. Stanton, was read by J. F. Kemp, in the absence of its author. The reading of papers was then begun.

Notes on the Sands and Clays of the Ottawa Basin. R. W. ELLS, Ottawa, Canada.

Dr. Ells included in the area discussed the region lying between Lakes Huron, Erie and Ontario, and the Ottawa river. He gave a brief review of the rocks lying to the north, which have been the source of the loose materials now forming the surface deposits. The sands and the marine clays, so prolific in shells, and several kame-like ridges were described, and the evidence of submergence beneath the sea was adduced at length. In general the interpretation corroborated the views already urged by Sir J. William Dawson, and widely familiar.

The discussion was quite protracted and developed a variance in interpretation on

the part of the several speakers. The close connection of the glacial lakes, the precursors of the present Great Lakes, with the sands and clays was brought out; the presence of marine and fresh-water shells and the evidence of differential uplift all came up. The discussion was sustained by Messrs. Scott, Taylor, Ami and Coleman.

Topography and Glacial Deposits of the Mohawk Valley. Albert Perry Brigham, Hamilton, N. Y.

The present topography of the Mohawk Valley was described and some probable features of the ancient drainage stated. The Mohawk was considered as a monoclinal valley following the outcrop of the Utica and Hudson River shales which had diverted the southern Adirondack drainage by headward cutting west to Little Falls. Further evidence for the divide located by Chamberlin at this point was given in the valley filling and arrangement of streams to the westward. A possible discharge of the West Canada Creek into the main valley west of Utica was suggested. The Mohawk faults were reviewed in their bearing on the maturing of the valley. The westward movement of the lower Mohawk Valley glacier was confirmed by some additional evidence. The drift deposits fall into three groups, viz.: terraces and deltas west of Utica; terraces, kames and other morainic masses between Utica and Little Falls; terraces of massive till mantled by sands and clays, below Little Falls. The drift of the valley was described as representing lacustrine and fluviatile phases of ice retreat, and some reasons were given for a discharge prolonged and strong, but not of great depth.

The paper was illustrated by a good map and was listened to with deep attention, as so many of the fellows were familiar with the region. The evidence of stream robbing by the Mohawk in its upper portion and the diversion of the southwest Adirondack drainage to the Hudson was striking.

The paper was discussed by F. B. Taylor. At its conclusion the Society adjourned until 8:30 p. m., at which time it reconvened in the Physics lecture room of the University, to listen to the presidential address of the retiring President, Professor Edward Orton. The subject was 'Geological Probabilities as to Petroleum' and was an able review of the hypotheses advanced regarding oil and gas. The speaker was happily introduced by Dr. George Dawson, Director of the Canadian Geological Survey.

On Wednesday, at 10 a. m., the meetings were resumed. Before the reading of papers was begun the Committee on Photographs presented a report from its Chairman, Dr. George P. Merrill, of Washington. The report showed that 134 new photographs had been received during the year, bringing the number up to 1,558. The Committee has also received a collection of 300 negatives taken by the Second Geological Survey of Pennsylvania. An exhibition of the pictures now in the possession of the Society was made in an adjoining room, and it was evident that a wealth of illustrative material for geological instruction has been made available, from sources, such as survey negatives, that are not usually accessible.

The Topography and History of Jamesville Lake, N. Y. Edmund C. Quereau, Syracuse, N. Y.

Jamesville Lake is one of a class of small lakes in central New York which are often called 'Round Lakes,' a term which distinguishes them well from the 'Finger Lakes.' It lies between two of the main valleys (Onondaga and Butternut) which dissect in this region the New York plateau in a general south-north direction. The portion of the plateau between these two valleys is dis-

sected also, but not so deeply, by a series of small parallel west-east gorges or ravines, in one of which, the Jamesville gorge, the lake is situated. The immediate vicinity of the lake is channeled in a complicated manner by abandoned stream beds which run west-east, and whose sides are often terraced in such a manner as to make it evident that large quantities of water once passed across this region. Associated with these channels a number of kettle-like depressions are found, of round or oval outline and of varying dimensions. It is in one of the largest of these that the present Jamesville lake is situated. The lake basins were explained as probably caused in each case by a waterfall, which had hollowed out a depression or great pool at its foot.

The paper was discussed by W. M. Davis, who corroborated, from his own observations in the region, the views of the author; by H. L. Fairchild, who commented on the altitudes, and by F. B. Taylor, who connected the streams with the drainage of the glacial Lake Warren. This led to some estimate of the probable size of the river, and it was stated by A. P. Brigham and W. M. Davis to have been less than the present Niagara.

Notes on the Moraines of the Georgian Bay Lobe of the Ice-sheet. FRANK B. TAYLOR, Fort Wayne, Ind.

When the ice-sheet had retreated in the basin of Lake Huron so far as to leave the summit of Blue Mountain south of Georgian Bay uncovered, there still remained a well defined glacial lobe projecting towards the southeast nearly to Toronto and eastward beyond Lake Simcoe. This lobe was divided in two parts by the Penetang peninsula, the larger one extending southeast from Nottawasaga Bay, and the smaller one extending east-southeast from Matchedash Bay. Recently the moraines of the eastern limb of the Nottawasaga lobe were partially explored and a well defined series of five was found filling the interval from the head of Georgian Bay to the 'Oak Ridges' north of Toronto. During the later stages of this lobe there was a glacial lake covering Lake Simcoe and a considerable area to the east, and probably held up on that side by a lobe projecting from the northeast up the valley of the Trent River. Its beach is 90 to 100 feet above the Algonquin beach, a few miles northeast of Barrie. Well marked glacial striæ were found on the summit of the promontory of Blue Mountain, over 1,100 feet above Georgian Bay, running S. 60° E. Some of the moraines running along the east side of Lake Huron were also traced northward to the vicinity of Durham and Flesherton.

T. C. Chamberlin inquired regarding the direction of the glacial striæ as bearing on the views advanced, and the speaker replied that they bore S. 60° E. wherever visible. This brought out the observations of H. M. Ami that striæ in Ontario to the southwest of this region run southwest, and Robert Bell stated that they run southeast on Georgian Bay, but that at its north end they change to southwest. Robert Chalmers referred to the ridges, like drumlins, along Lake Ontario, on the line of the Pacific Railroad, and remarked that the associated striæ were variable from southeast to southwest. I. C. White asked about the height of the old Algonkian beach above Lake Simcoe, and F. B. Taylor replied that it was about 100 feet above the lake, which latter is 720 feet above tide.

Notes on the Geology of Montreal and Vicinity. FRANK D. ADAMS.

By means of the geological sheets of the Canadian Survey, Dr. Adams outlined the extent of the several formations from the old Laurentian gneisses, anorthosites and crystalline limestones on the north across the Paleozoic plain to the south. He gave

a brief description of the curious volcanic plugs now remaining as Mt. Royal and several others in an easterly line from it, and in a few words referred to their interesting petrographical character. The remarkable survival of Lower Helderberg strata in a patch of a few square feet on an island in the St. Lawrence, near Montreal, excited great interest, especially in their bearing on the views lately advanced by H. S. Williams on the line of entry of the late Silurian fauna into New York. The post-Pliocene deposits in the shape of the boulder clay; the bouldery gravels and stiff overlying clay; the Leda-clay and the Saxicava sand, all of which are carved into the marine beaches which now form the terraces on which the city is built, received passing mention. The way in which the geological structure had determined the location of the city and the settlement of the country was the closing topic of the paper.

The discussion turned at first on the determining factors in the present relations of of the ancient crystallines and the paleozoics, and whether the rather straight contact shown on the map is the result of faulting or of the creeping-up of the Cambrian sea on an even shore-line. Dr. George Dawson and several other Canadian geologists said that there were no faults, but that the inroad of the sea had brought about the phenomena. The discussion then turned on the course of events in the region in the times after the latest paleozoic sediments and before the superficial deposits had accumulated, and developed the fact that it is easy to ask questions which no Fellow can answer. The discussion also turned on the Helderberg outlier and its relation to the older Ordovician strata. It was shown to rest on a curious tufa deposit, but, as remarked by H. M. Ami, the Devonian to the east rests unconformably on the Cambrian. The discussion was participated in by H. P. Cushing, H. M. Ami, W. M. Davis, George M. Dawson, J. H. Tyrrell, R. W. Ells and F. B. Taylor.

Marine Cretaceous Formations in Deep Wells in Southeastern Virginia. N. H. Darton.

The paper was read by W. N. Rice, in the absence of the author. It recorded the sections recently revealed by deep wells at Norfolk, Va., Fortress Monroe, Lambert's Point and Jetty Point. They show that the marine Cretaceous, which was thought to be growing thin in southern New Jersey, thickens again farther south.

The Cretaceous Series of the West Coast of Greenland. Charles Schuchert and David White.

The paper was presented by David White and described the results obtained the past summer while exploring the plant beds along the Nugsuak peninsula. On a base of gneisses lie 3,000 feet of sediments forming the plant beds, and on these, 4,000 feet of basalt flows. The beds dip away from the gneisses and are available between tidewater and the basalt, which covers their upturned edges and pierces them in dikes. The stratigraphical section, with the European equivalents, is as follows:

Patoot = Senonion Atane = Cenomanian Kome = Urgonian	Cretaceous

All corresponded to the American Potomac formation, except, perhaps, the Patoot. Marine fossils were also found, giving the offshore equivalents of the plant beds. The latter are remarkable in affording dicotyledons. W. B. Scott asked about the equivalency of the Potomac, to which the speaker replied that it would be fully discussed in an early paper by Dr. L. F. Ward. T. C. Chamberlin inquired as to the climatic conditions as indicated by the Potomac floras north and south. Mr. White replied that they showed no climatic

differences, and that the Nugsuak plant beds filled up hollows in the gneisses, and were not very different now in their position as regards the sea from that occupied at the time of their deposition.

(To be concluded.)

J. F. KEMP.

COLUMBIA UNIVERSITY.

THE SECTION OF ANTHROPOLOGY AT ITHACA.

IN accordance with an arrangement made at Detroit, a meeting of Section H (Anthropoloy) of the American Association for the Advancement of Science was held at Cornell University, at Ithaca, December 29 and 30, 1897.

On Wednesday morning, December 29th, the Section organized with Vice-President W J McGee in the chair and Dr. A. Hrdlicka as Secretary *pro tem.* Immediately afterward the session adjourned to permit the members to attend the meeting of the American Psychological Association then in progress, and to unite with the American Society of Naturalists during the afternoon.

The Section reassembled for the reading of papers Thursday morning. The first communication was a full account of the elaborate 'Mythology of the Bella Coola,' by Dr. Franz Boas. After describing the beliefs of this remarkably interesting Indian tribe, the author proceeded to a comparison of these beliefs, and the ceremonies by which they are attended, with those of neighboring tribes, and discussed the development of myths in general as well as the special lines of mythic development traced among the Bella Coola. Comments were made by Dr. Farrand, Professor Cattell and Dr. Beauchamp.

This was followed by a paper on the 'Loss of Aboriginal Arts and its Significance,' by Rev. W. M. Beauchamp, in the course of which the author emphasized the transformation in the aboriginal arts of central New York attending the incursion of conquering tribes.

On behalf of the Committee of the Association on 'The Ethnography of the White Race in the United States,' Dr. Boas made a brief report of progress.

The next communication was an illustrated account of 'Dwellings of the Saga Time in Iceland, Greenland and Vineland,' by Miss Cornelia Horsford. Beginning with a description of the Norse Sagas, covering the period A. D. 875–1025, Miss Horsford noted the recent researches concerning the habitations described in the Sagas. None of these have thus far been identified in Denmark, Sweden or Norway, but several have been identified with considerable certainty in Iceland, chiefly through the investigations of the Icelandic Antiquarian Society, and also in Greenland, while a few have been identified with fair certainty in the 'Vineland the Good' of the Sagas—what is now eastern Massachusetts. The houses of the three countries were illustrated and shown to be essentially similar by means of photographs and sketches of the ruins, and were identified in design and other characteristics with the house-types still surviving in Iceland. The paper was discussed by Dr. Boas, who pointed out the essential distinctness of the habitations described from those of the aborigines of America, including the Eskimo. Remarks concerning the extent and thoroughness of the investigation were also made by Dr. Beauchamp and the presiding officer.

The afternoon session began with a brief paper on 'Eskimo Boot Strings,' by John Murdoch. This was followed by an extended 'Preliminary Report on the Somatology of the Tribes of Northwestern Mexico,' by Dr. A. Hrdlicka, in the course of which a large number of crania from Mexico and the United States were described, while the distribution of the types

was indicated. Dr. Boas and others contributed supplementary information.

'Views of the Paleolithic Question,' by Rev. Stephen D. Peet, and 'The Collection of Anthropometric Data,' by Professor J. McKeen Cattell, were read by title.

The next communication was presented under the title 'Conditions attending the Rise of Civilization,' by W J McGee. The author pointed out that the development of civilization on the shores of the Mediterranean was attended by growing recognition of proprietary right in land, together with concomitant recognition of the territorial rights of others, and the gradual growth of law relating to boundaries, monuments and inheritances. He gave special emphasis to the altruistic character of the laws regulating territorial interest. Considering, then, the characteristics of life in desert regions, he showed that the tendency of common strife against hard physical environment is toward the development of an intimate coperation and interaction of such sort as to simulate the altruism of civilization. He then touched briefly on the influence of desert conditions in promoting the recognition first of custom and then of law corresponding to the customs and laws of advanced culture. The communication was discussed by Professor J. Mark Baldwin, Dr. Farrand and Dr. Boas.

An informal symposium followed on the question 'Will Winter Meetings Meet the Need of American Anthropologists for Organization?' It resulted in a decision to recommend to the Association that provision be made for a meeting of the Section of Anthropology to be held in New York during the Christmas holidays of 1898. Incidentally the need of a medium for the publication of anthropologic papers received consideration, and a special committee was appointed and given power to act toward the establishment or adoption of an American anthropological journal, the committee consisting of Messrs. Boas (chairman), Brinton, Putnam, Frank Baker and McGee.

The Section adjourned at 5 p. m. to meet with others at Boston.

W J McGee,
Vice-President Section H.

ALONZO S. KIMBALL.

Professor Alonzo S. Kimball, who was for a quarter of a century professor of physics in the Worcester Polytechnic Institute, was born at Center Harbor, New Hampshire, in 1843. He was prepared for college at New Hampton Academy, and was graduated from Amherst College in 1866. In 1871 he was called to the Worcester Polytechnic Institute, which had just graduated its first class. He organized the department of physics, and the Institute was among the first in the country to provide systematic instruction in a physical laboratory. After seven or eight years of great activity and usefulness, shown alike in the development of the important department of which he had charge, and in a series of valuable original contributions to physical science, he was, in 1879, attacked by a painful disease, which, in spite of the highest medical skill in both this country and Europe, proved to be incurable, and from the effects of which he died on December 2, 1897. Notwithstanding the steady progress of a malady which entailed nearly continuous suffering, Professor Kimball, through all these years, discharged the constantly increasing duties of his position to the great satisfaction of the officers of the Institute and of the hundreds of pupils to whom his life and work were always inspiring. In addition to his regular work in Worcester, he was for several years a lecturer at Mt. Holyoke College, of which institution he was for many years and at the time of his death a Trustee. While the Salisbury Laboratories of the Polytechnic Institute were being built he spent a year

in Europe, engaged in the study of the best European establishments, and in selecting apparatus for the better equipment of the new building to which his department was to be transferred. While there he suffered from a more than usually acute attack and submitted to a difficult and dangerous surgical operation, which it was hoped might lead to a permanent recovery. Only temporary results followed, however, and within the past five or six years several similar operations were performed with the same result. His work in the lecture room and laboratory was not seriously interrupted, although carried on under conditions that would have made it impossible with most men. When, ten or fifteen years ago, the creation of a new branch of engineering began, Professor Kimball was not slow to appreciate its importance, and the Institute was among the first schools of applied science to offer a course in electricity with ample equipment of electrical machinery and other appliances necessary to its success. The management and development of this course, along with the courses in pure physics, remained with him until about two years ago, when its magnitude became such that it was necessary to set off the electrical engineering as a separate department with a special professor at its head. With lessened responsibility, his enthusiasm and, for a time, his activity greatly increased, but his enjoyment of the new conditions was cut off by his death, a few weeks ago.

Professor Kimball was uncommonly skillful in experiment, possessing originality in design and his work was done with that sense of refinement and precision which is essential to original research. Between the years 1875 and 1880 he published in various scientific journals a series of papers, each the result of wisely planned and carefully conducted experiment and all of much value. The first was on 'Sliding Friction,' published in the *American Journal of Science*, March, 1876. It marked the beginning of an important investigation of the general subject of friction, the results of which were published in subsequent numbers of the same journal, in Van Nostrand's *Engineering Magazine* and elsewhere. In these papers he shows that friction between sliding surfaces is independent of neither velocity nor pressure, experiment pointing to the existence of a maximum coefficient of friction depending on both velocity and pressure. During these years there were also other papers on the influence of temper upon the physical properties of steel, the effect of magnetization on the physical properties of iron, etc. There was also prepared and printed a small treatise on thermodynamics, arranged especially for the use of his pupils, exhibiting much originality and clearness in method of presentation.

From the quality of Professor Kimball's work during this period there can be little doubt that he would have achieved marked distinction in his chosen field but for the failure of his health, from which he never recovered. From 1879 to his death, a period of nearly twenty years, his fight was against odds that must have long ago defeated any one endowed with only the average human courage and tenacity of purpose. Conscientiously discharging every duty that the day brought, he had little energy left for research work, although he published occasional papers and was always anxious to utilize any temporary increment of vitality in that way.

Although a member of numerous scientific societies, Professor Kimball was rarely seen at their meetings, his long illness thus standing in the way of those intimate personal and social relations with his confreres for which he was by nature so admirably fitted. His manner was charming, his good nature unceasing, his instincts fine and noble.

To those with whom he was associated in work, or who were otherwise privileged to know him intimately, his prolonged but splendidly heroic struggle with a fatal disease, together with the uniformly high standard of performance which that struggle did not sensibly affect, will ever remain an inspiring example of the best of human qualities.

T. C. M.

CURRENT NOTES ON PHYSIOGRAPHY.

MILNE ON SUBOCEANIC CHANGES.

This topic, already noted in Science (September 3, 1897), receives further details (London Geog. Journ., X., 1897, 259–289), which will well repay study. Their practical importance may be inferred from the expense—half a million sterling—of fifteen cable repairs necessitated by submarine disturbances. Their specific character appears in the items of place and date, as well as in the photographic illustrations of torn cables, gathered by the author with much care from usually inaccessible sources. Their novelty is illustrated in such items as the following: "The Bilbao cable broke down periodically, usually in March during or after a heavy northwest gale, at a point about thirty miles off shore; when repaired, it was invariably found that three or four miles of cable had been buried. This is attributed to a strong submarine current, caused by the piling up of surface water by the wind; the under current crossing the drowned prolongation of a river valley with steep walls, which, when undercut, fell in masses." Again: "The military and naval reserves were called out in Australia, in 1888, when the simultaneous interruption of two cables cut off communication with the rest of the world for nineteen days and gave rise to the fear that war had broken out in Europe." The physiographical interest of the article comes from the constant association of cable fractures with the steeper slopes of continental margins where the submarine contours are not only irregular but variable; this being in strong contrast to the undisturbed condition of cables in deep water on a soft level bottom, of which Kipling says:

> There is no sound, no echo of sound, in the deserts of the deep,
> Or the great gray level plains of ooze where the shell-barred cables creep.

Near the continents, slopes of 1 in 7, or even 1 in 3 are discovered. Changes of depth amounting to 100 or 200 fathoms are determined by soundings before and after cable fractures in regions of disturbance.

In conclusion, Milne makes two suggestions: First, that he would be glad to receive (at Shide Hill House, Newport, Isle of Wight, England) details regarding cable interruptions in any part of the world; second, that seismographs, similar to the one he has on the Isle of Wight, should be installed in various countries, their cost being about £50; this suggestion being adopted by the British Association, whose circular on the subject may be obtained from their Seismological Committee (Burlington House, London, W.).

HATCHER'S EXPLORATIONS IN PATAGONIA.

Primarily with the object of collecting fossil mammals, Princeton University sent J. B. Hatcher to Patagonia in January, 1896. He returned in July, 1897, and after leaving reports on his geological and geographical results (*American Journal of Science* and *National Geographical Magazine* for November) he has gone out on a second expedition. The geographical description gives an excellent picture of the Patagonian pampas. They consist of a heavy series of fresh-water (continental) deposits, deeply cut by west-east valleys and strewn over with drift from the Andes, morainic near the mountains and water-washed farther east. The terraces, by which succes-

sive plains descend toward the Atlantic, famous since Darwin's voyage, are accounted for as sea cliffs, cut during the recovery from a period of depression after the valleys had been eroded. Volcanic cones and lava flows give some variety to the region. Salt lakes are barred in valleys behind the sand reefs of the former shore lines, and their salt is explained as having been retained since a part of the ocean was there enclosed. This conclusion, as well as the implication that salt lakes are usually supplied by salt springs, seems open to question; but as a whole the geographical descriptions are much more lucid than those that one usually meets in geographical magazines.

THE ST. CROIX DALLES, MINN.

A THESIS by C. P. Berkey, University of Minnesota, discusses the 'Geology of the St. Croix Dalles' (*Amer. Geol.*, XX., 1897, 345–383) and throws much light on the geography of the district, which seems to be one of special interest. Cambrian strata lying unconformably on pre-Cambrian igneous masses constitute the bed-rock of the region. Heavy glacial deposits, morainic and washed, overspread the bed-rock and determine much of the surface form. Large glacial rivers and the discharge of the glacial West Superior lake have carved important valleys, of which the rock-walled dalles attract most attention. Several abandoned river-courses contain lakes, some of which seem to belong in the rare species of pools excavated by the plunge of extinct falls.

SURFACE CURRENTS OF THE NORTH SEA.

OBSERVATIONS made for the Fishery Board of Scotland on the surface currents of the North Sea, chiefly by means of floating bottles, are discussed by T. W. Fulton (*Scot. Geogr. Mag.*, XIII., 1897, 636–645). A tolerably regular circulation around the margin of the sea is found at an average rate of two or three miles a day, southward on the west, northward on the east side of the sea. The velocity varies with the winds, and after a period of unusual and persistent southeasterly winds in December, 1896, and January, 1897, the current was reversed along the coast of Great Britain. The currents are, therefore, ascribed to the prevailing westerly winds, which drive the water towards the eastern side of the sea and tend to heap it up there. In the firths the currents are irregular, varying with winds and tides.

W. M. DAVIS.

HARVARD UNIVERSITY.

CURRENT NOTES ON ANTHROPOLOGY.

THE UNITY OF THE HUMAN SPECIES.

LITTLE is now written about 'monogenism' or 'polygenism.' To the physical anthropologist that question is quite absorbed in the wider one of 'variation.' But the psychical unity of the species is still lacking definition. A noteworthy contribution to it is one by the Marquis de Nadaillac in the *Revue des Questions Scientifiques* for October last. He points out the unending similarities in implements, arts, funeral rites and religious symbols in tribes of like stages of culture in all times and places.

That these are proofs of psychic identity there can be no doubt. But it is not quite clear how the author interprets them. In some passages he speaks of such customs and inventions being 'handed down from unknown ancestors by generation to generation;' while elsewhere he says the solution lies 'in the identity of the mind of man in all periods and in all regions.' The latter is the position which is most acceptable to the trained ethnologist.

LOCAL ETHNOGRAPHIC COLLECTIONS.

IN the rapid changes of American history the mode of life of one generation is scarcely known to that which follows it. Hence the value of collecting, while we can, those ob-

jects which represent how our near ancestors worked and played. No recent publication better illustrates how much of worth there is in such a collection than a descriptive catalogue of objects in the Museum of the Historical Society of Bucks County, Pa., prepared by Mr. Henry C. Mercer. It bears the felicitous title 'Tools of the Nation Maker,' and is handsomely printed and covered. The notes, folk-songs, etc., which the author adds render it much more than a catalogue, and the index is a model of completeness. Copies can be obtained through Mr. Mercer (Doylestown, Pa.).

RACIAL GEOGRAPHY OF EUROPE.

On previous occasions attention has been called in these notes to the excellent series of articles on the racial geography of Europe contributed by Professor W. Z. Ripley to the *Popular Science Monthly*. The eleventh instalment, that in the December number, dealt with the British Isles, and is of special interest to English-speaking peoples. In preparing it Professor Ripley was actively aided by members of the Anthropological Institute of Great Britain, and officially by that institution itself. His article, therefore, represents the most recent and thorough scientific study of the population of the British Isles.

D. G. Brinton.

University of Pennsylvania.

SCIENTIFIC NOTES AND NEWS.

THE UNITED STATES FISH COMMISSION.

As directed by the American Society of Naturalists, Professor Henry F. Osborn presented to President McKinley, on January 7th, the resolution passed by the Society at the Ithaca meeting, and published in the last issue of this Journal. As it is desirable to give this resolution the widest possible circulation, it may be repeated:

"*Resolved*, That the American Society of Naturalists, as representatives of the principal scientific and educational interests of this country, unanimously express to the President and Congress of the United States their sentiment that the Commissioner of Fish and Fisheries should, according to the law of 1888, governing his appointment, be 'a person of proved scientific and practical acquaintance with the fish and fisheries of the coast.'

"*Resolved*, That it is of the utmost importance that the Fish Commission, as one of the most useful scientific institutions of the government, should be free from political influence and should be administered with the highest degree of scientific efficiency by an experienced officer."

The President received the resolution very courteously and replied that he recognized it as representing the sentiment of all the institutions of the country, and that the United States Fish Commission should coöperate with the colleges as originally planned by Spencer F. Baird. His decision in the matter of appointment will not be made public at present.

THE WASHINGTON ACADEMY OF SCIENCES.

On September 15, 1897, the Council of the Geological Society of Washington invited the other societies represented in the Joint Commission of the Scientific Societies of Washington to appoint 'a committee of conference, to meet similar committees from other societies,' for the consideration of certain questions relating to the joint organization of the scientific societies. In response to this invitation, the following committees were appointed: From the Anthropological Society, Frank Baker, W J McGee, Lester F. Ward; from the Biological Society, L. O. Howard, C. Hart Merriam, George M. Sternberg; from the Chemical Society, C. E. Munroe, W. H. Seaman, Wirt Tassin; from the Entomological Society, W. H. Ashmead, Theodore Gill, C. L. Marlatt; from the National Geographic Society, Henry Gannett, G. K. Gilbert, Gardiner G. Hubbard; from the Geological Society, Whitman Cross, S. F. Emmons, Arnold Hague; and from the Philosophical Society, Marcus Baker, J. R. Eastman, Bernard R. Green. This Committee of Conference met on December 6 and organized by the election of J. R. Eastman as Chairman and Whitman Cross as Secretary; other meetings were held on December 9 and 11. After full discussion, the following resolutions, among others, were

adopted and recommended to the governing boards of the several scientific societies:

"*Resolved*, That in the judgment of this Committee, the autonomy of the several scientific societies should be maintained.

"*Resolved*, That in the judgment of this Committee the Joint Commission should be modified in the following particulars:

1st, That its name be changed to the Washington Academy of Sciences; 2d, That it assume independent scientific functions; 3d, That it have power to add to its members.

"*Resolved*, That the Committee therefore recommends to the several societies that they instruct the Joint Commission to take such action as may be necessary to carry the above recommendations into effect."

The conferees subsequently reported their action to the governing boards of the several societies, and all of these have adopted the resolutions substantially as voted by the Committee of Conference. The matter comes up for action at a special meeting of the Joint Commission on January 11th.

THE SWEDISH ARCTIC EXPEDITION OF 1898.

THE preparations for this expedition are described in a recent issue of the London *Times*. It will be under the leadership of Dr. A. G. Nathorst, who accompanied Nordenskjöld in his Greenland expedition of 1883. Its main object is to examine the eastern side of Spitzbergen, Wiche's Land and New Island—in short, the region between Spitzbergen and Franz Josef Land. But, as this area will probably not be accessible in the beginning of next summer, Dr. Nathorst intends to carry on investigations in western Spitzbergen, Northeast Land, Bear Island, etc. He has bought the 'Antarctic,' which in 1895 carried the whaling expedition to the South Polar Sea; it is now being overhauled and equipped for the expedition. The captain will be Emil Nilsson, who has been several times to the Yenisei and who commanded the 'Sofia' during Nordenskjöld's Greenland expedition in 1883. Dr. Nathorst himself will have special charge of the geological work. The zoologist will be Mr. G. Kolthoff, of Upsala, curator of the fine biological museum at Stockholm. He also was in the 1883 expedition, and has made ornithological expeditions to Iceland and the Farös. Dr Axel Ohlen, of Lund, will also look after the zoology. He has dredged off the east coast o Greenland, has visited Baffin's Bay and Melville Bay, and was in the recent Swedish expedition to Tierra del Fuego. Dr. Gruner Andersen will be the botanist. He has studied the Arctic flora on the mountains of Sweden and Norway. The hydrographer will probably be Dr. Axel Humberg, also a well-known geologist; he also was in the 1883 expedition. The hydrographical work will form a very important part of the researches of the expedition. The cartographical work will be under the charge of Lieutenant Otto Kjellström; in this department photographic methods will be utilized as an aid to the ordinary methods. Special attention will be given to glaciers wherever found, and the surgeon, Dr. E. T. Levin, will investigate the occurrence of bacteria in the Arctic regions.

GENERAL.

THERE were in attendance at the Ithaca meeting of the American Society of Naturalists and Affiliated Societies 166 members coming from 47 institutions.

AMONG those who have accepted nominations as Vice-Presidents of the General Committee of the Fourth International Congress of Zoology are the following: Professor R. J. Anderson, of Belfast; Professor Bridge, of Birmingham; Professor D. J. Cunningham, of Dublin; Professor Herdman, F.R.S., of Liverpool; Professor M'Intosh, F.R.S., of St. Andrews; Mr. J. Cosmo Melvill, of Manchester; Professor Lloyd Morgan, of Bristol; Professor Alleyne Nicholson, F.R.S., of Aberdeen; Dr. Scharff, of Dublin; Dr. Traquair, F.R.S., of Edinburgh; Canon Tristram, F.R.S., of Durham; Lieutenant-Colonel R. G. Wardlaw Ramsay, and Professor Percival Wright, of Dublin.

As we learn from *Nature*, the Council of the London Chemical Society have recommended the following as foreign members to be balloted for at the next meeting, January 20th: Professor Remsen, Baltimore; Professor Troost, Paris; Professor Moissan, Paris; Professor Raoult, Grenoble; Professor Oswald, Leipzig; Professor Curtius, Bonn; Professor Mensutkin, St. Petersburg; Professor Markownikow, St.

Petersburg; Professor Arrhenius, Stockholm; Professor Waage, Christiania; Professor Franchimont, Leyden; Professor van der Waals, Amsterdam; Professor Spring, Liége; Professor Körner, Milan.

Sir W. H. Flower has been elected associate of the Royal Academy of Sciences, Belgium.

Queen Victoria has conferred among the usual New Year honors the following: knighthood on Professor George Brown, Consulting Veterinary Advisor to the Board of Agriculture; Ernest Clarke, Esq., Secretary to the Royal Agricultural Society; John Struthers, M.D., LL.D., late President of the Royal College of Surgeons of Edinburgh, and John Batty Tuke, Esq., M.D., President of the Royal College of Physicians of Edinburgh; The K.C.B. on Professor Gairdner, Dean of the Faculty of Medicine, Glasgow University, and the C.B. on Professor D'Arcy Thompson.

A bronze bust of the late General Francis A. Walker, of the Massachusetts Institute of Technology, was presented formally by the undergraduate students to the Institute of Technology, on January 5th, the anniversary of General Walker's death.

Dr. A. D. Waller has resigned from the Fullerian professorship of physiology and comparative anatomy of the Royal Institution owing to the lack of any facilities for physiological research.

Mr. W. P. Pycraft has left Oxford, according to *Natural Science*, and has been appointed temporary assistant in ornithology in the British Museum (Natural History). He will devote his attention specially to the arrangement of the collection of skeletons of birds.

Governor Black has appointed the following as delegates to represent the State of New York at the Fisheries Congress to be held at Tampa, Fla., on January 19th: Tarleton H. Bean and Warren N. Goddard, of New York City; Charles L. MacArthur, of Troy; Charles L. Babcock, of Rochester; Edward Thompson, of Northport, and A. Nelson Cheney, of Glens Falls.

News has just been received of the death of Professor Thomas Jeffery Parker, F.R.S., on November 7th, at Dunedin, New Zealand. Professor Parker was from 1872 to 1880 demonstrator in biology at the Royal College of Science. He then went to New Zealand as professor of biology in the University of Otago, where he did much to promote the advancement of natural science in the colony both by his lectures and addresses and by founding the Otago University Museum, of which he was curator at the time of his death. In 1884 he published 'A Course of Instruction in Zootomy (Vertebrata),' and a 'Text-book of Zoology,' written jointly with Professor W. A. Haswell, was completed before his death and will be published by the Macmillans.

Dr. Ernest Hart, since 1866 editor of the *British Medical Journal*, died in London on January 7th. He had made the *Journal*, perhaps, the leading medical journal of the world, only rivalled by the *Lancet*, and had at the same time built up the British Medical Association to be probably the strongest professional organization in the world. Dr. Hart was the author of many publications and was prominent in numerous and important sanitary and social reforms.

We regret also to record the death of Professor Francesco Brioschi, the mathematician, President of the Accademia dei Lincei, at Milan, on December 13th, aged seventy-two years; and of Professor James Holm, professor of physics at the South African College, Capetown, and before 1895 demostrator in physics at University College, Nottingham, aged twenty-eight years.

The *Science Teacher* is the name of a monthly publication just established by Mr. A. T. Seymour, instructor in science and mathematics, Westminister School, Dobbs Ferry, N. Y. There is room for a scientific journal that will be of interest to teachers in the secondary schools, and we hope that this journal will fill the place, but in order to do this it will be necessary to improve upon the first number.

The *Philadelphia Medical Journal*, established under the auspices of the leading physicians and medical men of Philadelphia and edited by Dr. George M. Gould, has begun publication with the New Year. The first number contains

contributions from Dr. J. M. Da Costa, Professor N. Senn, Professor William Osler, Professor W. W. Keen and other distinguished contributors. Much space is devoted to editorials, notes and a review of the contents of other medical journals in the English language. Under its present editorship the *Journal* is sure to be interesting and agressive, as witness the following from the editorial columns: "Because a city [*i. e.*, New York] has a great harbor it is boobyishness to boast and be proud. * * * * * It will require a good many years before the supremacy of Philadelphia as the medical center of America will be seriously disputed. But we are less interested in the braggart's vaunt of any supremacy, etc."

AT a meeting of the Zoological Society of London on November 14th Mr. J. Graham Kerr gave an account of his recent expedition, along with Mr. Budgett, to the Chaco of Paraguay in quest of *Lepidosiren*, and made remarks on its habits as there observed. Mr. Kerr also gave a general account of the early stages of its development, drawing special attention to the presence in the larva of external gills and a sucker similar to those of the Amphibia. Mr. Oldfield Thomas, F.Z.S., read a paper entitled 'On the Mammals obtained by Mr. A. Whyte in North Nyasaland, and presented to the British Museum by Sir H. H. Johnston, K.C.B.; being a fifth contribution to the Mammalogy of Nyasaland.' This memoir contained notes on 61 species of mammals, 4 of which were characterized as new, viz, *Macroscelides brachyrhynchus malosæ*, *Crocidura lixa*, *Myosorex soulla* and *Graphiurus johnstoni*.

IN the *Journal* of the Boston Society of Medical Sciences, for December, 1897, Dr. C. F. Hodge gives 'some results of the action of alcohol on dogs as regards non-viability and malformation of the young, and severity of attack in an epidemic of distemper.' These observations, which are a continuation of the experiments described in *The Popular Science Monthly* for April, 1897, show that of the progeny of the alcoholic pair, twenty pups, born in three litters, eight were malformed and six born dead. The normal pair produced sixteen whelps in three litters, and not one of these was born dead, and only one was malformed. During an epidemic of distemper one of the alcoholized dogs died, and all save one were seriously affected; none of the other dogs exhibited any serious symptoms of disease.

THE monkeys in the vicinity of Hardwar, India, are said to be seriously affected with the bubonic plague, which they are supposed to have contracted through visits to infected rooms in the town of Hardwar. The proposed extermination of the monkeys with a view of putting an end to the disease so far as they are concerned might clash seriously with the religious views of the Hindoos.

MAYOR QUINCY, of Boston, in his inaugural message urgently recommends the establishment of a marine aquarium in Boston. He notes that for ten years or more the Boston Society of Natural History has been engaged in considering and endeavoring to carry through plans for natural history gardens, to be established within the parks under three different divisions—one, the marine aquarium, to be located at Marine Park; another, the fresh water aquarium, to be located at Jamaica Pond, and the third, the Zoological Garden, to be located in the Long Crouch Woods, Franklin Park. The total expense of carrying out the complete plans is estimated at $200,000, and Mayor Quincey strongly recommends them. He urges that $65,000 be appropriated at once for the marine aquarium.

GOVERNOR BLACK, of New York, in his recent message pays special attention to the forestry interests of the State. He proposes that the State should purchase a tract of forest land and cultivate it scientifically as a means of diffusing knowledge and showing the revenue-producing character of such an investment sagaciously administered. It should be kept clear of politics by giving the Regents of the University or the Trustees of Cornell University charge of it, and an annual report of progress and results should be made to the Legislature.

SENATOR PLATT, of New York, has introduced into the United States Senate a bill to establish a national park on the Palisades of the Hudson River.

A BILL which will limit the lawful use of hypnotism to licensed physicians will, it is said, be introduced into the New York Legislature during the present term. A number of instances have been collected to prove that the use of hypnotism by irresponsible persons is dangerous and opposed to the public good. The bill, before introduction, will be submitted to eminent lawyers for revision, and when finished will be supported, it is said, by the medical societies of the State.

BILLS have been introduced into the United States Senate and House of Representatives making appropriations for the continuation of timber tests by the Forestry Division of the Department of Agriculture. Senator McBride's bill appropriates $40,000, and Representative Hurley's $100,000.

AN appropriation of $200,000 is asked this year by the Gypsy Moth Committee, which has just made its annual report to the Board of Agriculture. The work of the past few years has convinced the Committee that extermination of the moth is not only possible, but certain, if sufficient sums be promptly appropriated for the purpose.

THE plaster casts used by Professor Osborn in his lecture on museums before the recent meeting of the American Society of Naturalists have been presented by him to Cornell University.

THE leading editorial in the January number of *Natural Science* endorses the article in the *Contemporary Review* on the fur-seals from which we recently quoted. The editorial concludes: "It may be retorted that if the Canadians are to be debarred from killing fur-seals at sea the Americans ought to be prevented from killing them on shore. But the conditions are totally different. On shore only non-breeding males with perfect skins are killed. No females or breeding males are taken. But at sea no such selection is possible; the sex cannot be determined until the seal is killed. Many of the seals escape with fatal wounds, and as the females are less active than the males, and are often hampered by the presence of their young, they are more easily captured. Hence the majority of the seals killed at sea are females. The economic value of the pelagic seal industry is now insignificant, and as it appears to be admitted by both sides that the herds of fur-seals are being greatly reduced in numbers by the excessive killing at sea of female seals, and the consequent starvation of nearly 20 per cent. of the young, it is to be hoped that effective measures may be taken to prevent this inhuman and wasteful slaughter."

THE new volume of 'Minerva' published by Trübner, Strassburg, has as a frontispiece an etching of Nansen.

Le Journal de Colmar, of December 12th, announces the translation of Hirn's 'Analyse élémentaire de l'Univers' into the Russian by General Starinkévitch. The translator informs the former secretary or personal friend of Hirn, M. E. Schwoerer, that the work is just issued and that he has prefaced to the text a biographical sketch of 'Hirn: sa vie et ses travaux.' General Socrate Starinkévitch is the Governor of Varsovie and one of the best known scientific men in Russia among the nobles of that rapidly developing country.

THE works of the United States Liquefied Acetylene Distributing Company, located at Jersey City, were completely destroyed by a series of explosions on December 24th. Two men were killed and others were injured. It is evident that the manufacture and use of acetylene should receive a thorough scientific investigation before it can take the place that its merits warrant.

THE royal British Antiquarian and Archæological Societies have lodged a petition with Lord Salisbury protesting against the peculiar form of prison labor in Egypt since the Khedive's penitentiaries and jails have been under English management, says the *Scientific American*. It seems that the convicts, of whom there are twelve hundred in the Jourah prison alone, are employed in manufacturing bogus antiques, for which there is reported to be a large market, especially in America. The petitioners declare that the forgeries are so clever as to be scarcely distinguishable from the real article. As yet only antiques of relatively small dimensions have been produced, but the prison authorities express the hope of being able in course of time

to turn out full-fledged mummies and sarcophagi. The scientific societies in England point out, with some degree of justice, that while this form of prison labor may have commercial advantages it practically renders the British government a party to fraud.

PER DUSÉN, the Swedish engineer and bryologist, has returned from Tierra del Fuego and Patagonia, where he has been engaged in scientific research since September, 1895.

AT a meeting of the Royal Colonial Institute, London, on November 21st, Mr. W. Saville-Kent, late Commissioner of Fisheries to the Government of Queensland, Tasmania and Western Australia, made an address on the natural history of Australia. Lord Loch, who presided, referred, at the close of the lecture, to the question of Antarctic exploration. He said there was a movement on foot at the present moment, which was receiving very strong support, for fitting out an expedition, and he trusted that the Council of the Institute would give that movement, when it came in a very short time prominently before the public, every support. This matter of exploring the Antarctic regions had long occupied the attention of the several colonies in Australia. During the time he was Governor of Victoria there was a strong feeling in favor of assisting any such movement. If the Imperial Government would have assisted in fitting out an Antarctic expedition these colonies, and he believed others, would have willingly joined. Whether circumstances that had since occurred in Australia would enable them now to join in any movement that might be brought forward by the Imperial Government he did not know, but he believed there would be a strong expression of opinion in Australia in favor of the southern colonies joining in any organized expedition, whether assisted by the government at home or promoted by private enterprise entirely, to carry out Antarctic exploration.

UNIVERSITY AND EDUCATIONAL NEWS.

PRESIDENT HARPER announced at the recent Quarterly Convocation of the University of Chicago that Mr. Rockfeller had given $200,000 to maintain the University in its present condition during the year beginning July 1st. It is announced that the Rush Medical School of Chicago, with 77 instructors and 699 students, will probably affiliate with the University of Chicago.

THE east wing of Ottawa University (Catholic) was destroyed by fire on January 5th. The loss on the building is $50,000; on contents $30,000. The loss is covered by insurance.

THE Educational Council of the Nebraska State Teachers' Association has adopted the report of a committee of which Professor Bessey is chairman, recommending that only those institutions be recognized as colleges that require as a minimum for admission the equivalent of a good high-school course of at least three years above the eighth grade of the public schools, and that give a full four-year course of collegiate work of creditable grade for graduation.

A CHEQUE for £1,000 from Mr. Alexander Peckover, Lord-Lieutenant of the county of Cambridgeshire, has been received by the Vice-Chancellor of Cambridge University for the fund for rebuilding the School of Medicine and Surgery atttached to the University.

THE establishment of a new technological institute in the north of Prussia is being discussed in the German papers, and is favored by several political leaders, including Dr. von Gossler, lately Minister for Education and the Fine Arts. Danzig, Thorn and Posen are mentioned as suitable places. Hamburg is also agitating the question, though that city seems to want a university.

MR. FRANCIS RAMALEY, instructor of pharmaceutical botany in the University of Minnesota, has been appointed assistant professor of botany in the University of Colorado, Boulder, Col.

PROFESSOR KELLY has resigned from the chair of hygiene in King's College, London.

DR. ABELOUS has been appointed professor of physiology at the University of Toulouse, and Dr. F. Stanley Kipping, F.R.S., professor of chemistry at University College, Nottingham, England. Dr. Hollerman has qualified as docent in botany in the University of Berlin.

DISCUSSION AND CORRESPONDENCE.

THE THIRD INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY.

To the Editor of Science: The great success of the Second International Congress of Applied Chemistry leads to the belief that the next one, which is to be held in Vienna in July, 1898, will also be numerously attended. Nearly 2,000 members were present at the Paris meeting, and it required five large volumes to contain the report of its proceedings.

The undersigned have been appointed a committee in the United States to promote the interests of the Third International Congress of Applied Chemistry, and beg to call the attention of the chemists of this country to that meeting, with the hope that many may be induced to attend. Those who subscribe and receive their membership cards will be entitled to all reductions in rates going to and coming from Vienna which are arranged for members of the Congress. During the Paris meeting the French line of steamers reduced its rates 33 per cent. to members of the Congress. It is hoped that an arrangement can be made with some of the steamship lines during the coming summer for a similar reduction, although the committee has not yet been informed of any arrangement of this kind.

The opportunity of meeting distinguished chemists from all parts of the world should not be lost sight of, and will doubtless be appreciated by the American members. The scientific work of the Congress will be divided into the following sections:

Section 1. General analytical chemistry and apparatus, Dr. George Vortmann, Wien, IV Schaumburgergasse 16, Chairman.

Section 2. Food, medicinal and pharmaceutical chemistry, Dr. Ernst Ludwig, Wien, XIX Bilrothstrasse 72, Chairman.

Section 3. Agricultural Chemistry, Professor E. Meissl, Wien, II Trummerstrasse 3, Chairman.

Section 4. Chemistry of the sugar industry, Professor Friedrich Strohmer, Wien, IV/2 Schönburgstrasse 6, Chairman.

Section 5. Chemistry of the fermenting industries, Professor F. Schwackhäfer, Wien, XIX Karl Ludwigstrasse 74, Chairman.

Section 6. Chemistry of wine making, Dr. L. Rosler, Wien, Physiologische Versuchsstation, Chairman.

Section 7. Inorganic chemical industries (manufacture of sulphuric acid, soda, etc.), Herr Paul Seybel, Wien, III Reissnerstrasse 50, Chairman.

Section 8. Metallurgy and explosives, Professor Franz Kupelwieser, Wien, I Franzenring, Chairman.

Section 9. Organic chemical industries, Dr. Hugo Ritter von Perger, Wien, IV Gusshausstrasse 23, Chairman.

Section 10. Chemistry of the graphic industries (photo-chemistry, photography, etc.), Dr. Josef Maria Eder, Wien, VII West Cohnstrasse 25, Chairman.

Section 11. Didactic chemistry, Professor Franz Lafar, Wien, Technische Hochschule, Chairman.

Section 12. Electro-chemistry, Dr. Karl Kellner, Hallein, Salsburg, Chairman.

All persons desiring to become members, and wishing further information on the subject of the Congress can secure copies of the provisional 'reglement' by addressing the chairman of the committee, Washington, D. C.

Excursions, visits to localities of interest, banquets, etc., will be arranged for and definitely announced at a later period. Papers in German, French and English will be accepted, and authors are requested to communicate with the several chairmen and send them titles of papers and subjects which they would like to have discussed.

All persons intending to become members of the Congress may receive a membership card from the Secretary, Dr. F. Strohmer, by sending 21 francs to his address, IV/2 Schönburgstrasse, Nr. 6, Vienna, Austria. If preferred, members may send $4.30 to the Chairman of the American Committee, who will transmit the proper amount to Dr. Strohmer.

The provisional officers of the Congress are as follows:

President of Honor—Hofrath Professor Dr. Alexander Bauer.

Active President—Regierungsrath Dr. Hugo Ritter v. Perger, Professor in the Royal Imperia Technical High School of Vienna.

Vice-President — Regierungsrath Dr. Josef Maria Eder, Director of the Royal Imperial Graphic School in Vienna.

Secretary—Professor Dr. F. Strohmer, Director of the Experiment Station for Beet Sugar Industry, Vienna.

Respectfully,

H. W. WILEY, Department of Agriculture, Washington, D. C., *Chairman.*

W. O. ATWATER, Middletown, Conn.

PETER T. AUSTEN, 11 Broadway, New York, N. Y.

C. F. CHANDLER, Columbia University, New York, N. Y.

B. F. DAVENPORT, 161 Tremont street, Boston, Mass.

C. A. DOREMUS, 17 Lexington avenue, New York, N. Y.

C. B. DUDLEY, Altoona, Pa.

W. L. DUDLEY, Nashville, Tenn.

WM. P. MASON, Rensselaer Polytechnic Institute, Troy, N. Y.

WM. MCMURTRIE, 100 William street, New York, N. Y.

C. E. MUNROE, Columbian University, Washington, D. C.

A. A. NOYES, Massachusetts Institute Technology, Boston, Mass.

T. B. OSBORNE, New Haven, Conn.

IRA REMSEN, Johns Hopkins University, Baltimore, Md.

W. B. RISING, Berkeley, Cal.

EDGAR F. SMITH, University of Pennsylvania, Philadelphia, Pa.

F. G. WIECHMANN, 771 West End avenue, New York, N. Y.

FRANCIS WYATT, 39 South William street, New York, N. Y.

PROPOSED SYLVESTER MEMORIAL.

TO THE EDITOR OF SCIENCE—May I be permitted to appeal through your columns to all friends and admirers of the late Professor J. J. Sylvester to assist in founding a suitable memorial in honor of his name and for the encouragement of mathematical science. A movement was inaugurated on this side of the Atlantic soon after his death, and it was resolved by the promoters that a fund should be raised for the purpose of establishing a Sylvester Medal, to be awarded at certain intervals for mathematical research to any worker irrespective of nationality. For the purpose of carrying out the scheme, a strongly representative International Committee has been formed, and I should like to take advantage of this opportunity of expressing the great satisfaction which it has given to the promoters to be enabled to include in this Committee so many great and distinguished names from the American universities. In every case our invitation to join the Committee has been most cordially responded to, and the consent has in many instances been accompanied by expressions of the greatest sympathy and encouragement. The list as it stands practically includes the leading mathematicians of the whole world.

It has been estimated that a capital sum of $5,000 will be sufficient for the proposed endowment, and of this about one-half has already been subscribed here. In appealing to the American public to enable us to complete the desired sum I am in the first place prompted by the consideration that Sylvester's association with the Johns Hopkins University and the leading part which he took in advancing mathematical science in America renders his claim to estimation on the part of the citizens of your country quite a special one. It is but a modest endowment that we are asking for, and I am sure that all those who were personally acquainted with him and who realize the great influence which he exerted in raising the intellectual level of every institution with which he was associated will be glad of this opportunity of coöperating in the movement.

It is proposed that the fund when complete shall be transferred to the Council of the Royal Society of London, that body having undertaken to accept the trust and to award the medal triennially to mathematicians of all countries. I can hardly venture to trespass upon your courtesy to the extent of asking you to print the complete list of our Committee, but for your own information I beg to send a copy herewith. It will be sufficient to state that it comprises the names of President Gilman, of the Johns Hopkins University; of Professor Simon Newcomb, of Washington; of Professor Willard Gibbs, of Yale; of Professor Pierce,

Harvard, and many other well known American men of science. Subscriptions may be sent to and will be acknowledged by Dr. Cyrus Adler, the Smithsonian Institution, Washington, or by Dr. George Bruce Halsted, President of the Texas Academy of Science, 2407 Guadalupe street, Austin, Texas.

RAPHAEL MELDOLA,
Hon. Organizing Secretary.
TECHNICAL COLLEGE, LONDON, ENGLAND,
December, 1897.

TRAVEL AND TRANSPORTATION.

TO THE EDITOR OF SCIENCE: In my book on 'Travel and Transportation,' published in the *Smithsonian Report* for 1894, pages 280 and 281, will be found pictures of the only climbing device ever reported to have been used by an American Indian. At the time of describing this apparatus I had no information as to the manner of its use. During the last summer Doctor Franz Boas made a journey among the Bella Coola Indians, British Columbia, and saw the apparatus employed in climbing. It is also used by the Tlingit and other tribes as far south as Vancouver Island.

The wooden portion figured in the *Report* is not a boatswain's chair, but a foot-rest; the soft, flat portion is for use around the upper part of the back of the climber, under his arms. This combination is necessary in the Northwest country because the trees are not altogether devoid of limbs and knots; therefore, at certain points on the tree, the climber must unship his apparatus in order to pass the obstruction. My figures show that both parts of the device have loops so that the rope may be withdrawn at any time. The climber connects the upper half with the lower half of the apparatus by means of lines. When he arrives at a limb he draws his foot-board up as high as possible; then resting his body on this he readjusts the upper portion, sustaining his back above the obstruction, and moves upward as far as he can reach. Then, hanging himself in this, he is able to draw up and readjust his foot-board and make fast again after the manner of the inch worm.

The specific difference between this device and any other with which the writer is acquainted is in this facility of readjustment on account of knots and limbs by means of the connecting lines between the upper and lower half of the apparatus as explained by Doctor Boas.

O. T. MASON.

'TIME WASTED.'

TO THE EDITOR OF SCIENCE: Apropos the article in your last issue 'Time Wasted,' a professor in a reputable theological seminary in the West lately informed me that the astronomers were now convinced the end of the world was imminent. To substantiate his statement he showed me an article in a religious paper, *The Prophetic News and Israel's Watchman*, where such a prediction was made on the strength of some utterances from "Professor S. J. Carrigan, Director of the Carleton University, Northfield, Minnesota, the great university of the Northwest of America." Professor Carrigan is spoken of as having written an article in '*Popular Astronomy*, the recognized organ of American astronomy' on the subject, and he is said to have 'discovered the existence of three hitherto unknown planets, which are *tearing through space* between our earth and the sun.' The following extracts are then made from his article: "This new planet (one in the process of evolution from the sun) may at any instant break away from the sun, and the terrific explosion which will necessarily accompany this breaking away will produce a great disturbance of the entire universe, but particularly of the earth, perhaps completely smashing it, and surely destroying all animal life on land as well as in the waters." "Neither is this tremendous disturbance of the earth and *the destruction of all life* upon it completely unprecedented. A similar detachment of solar matter by the same means is known by the scientists to have occurred twenty-three million years ago, a period simultaneous with the Paleozoic age, at which time all animal and vegetable life then existing on the face of the earth was crushed out." "The results of my investigations on this subject indicate that the earth is closely approaching a critical epoch. These results convince me that it is imminent."

An account of the etiology of these peculiar products of journalism would be of interest.

X.

ZOOLOGY AT THE UNIVERSITY OF CHICAGO.

TO THE EDITOR OF SCIENCE: My attention has just been called to the following statement in SCIENCE, No. 157, p. 993:

"The student of science may fairly ask whether, when twelve doctorates are conferred in zoology and but three in Latin and Greek combined, this means that there is less demand for teachers of the classics or that a less exacting preparation is required."

Such is the comment appended to a mere summary of the Ph.D. degrees conferred by the University of Chicago during its first five years.

I am surprised to see insinuations of this kind obtruded as 'University News.' Neither 'a student of science' nor a student of anything worth naming could 'fairly' indulge in such ambiguous reflections on the basis of figures which he does not understand, and while pretending merely to report 'University News.' Moreover, it seems difficult to assign a proper motive for the remark under any circumstances. Had the reporter, who poses as 'a student of science,' even a reading knowledge of zoology, he would have seen the impertinence of his query. Our zoological theses already published would be sufficient, I think, to 'fairly' satisfy any one qualified to understand them whether the 'preparation' here demanded is adequately 'exacting.' Graduate students from colleges and universities in good standing, who devote from three to five years to their theses, are entitled to be judged by the merits of their work, and are not 'fairly' open to disparaging conjectures on the part of uninformed reporters of university news.

If comments were in order in such a report, I should have supposed that the result of 'five years of graduate work' might have suggested something more appropriate than an invidious comparison between zoology and the classics.

What excuse for saying 'but *three* in Latin and Greek combined,' when Latin is not represented in the 'three' at all? The author thus insidiously seeks to give point to the suspicion which he casts in his query, realizing that the contrast between zoology and Greek alone was not quite excuse enough for his remark. To one desiring to represent things 'fairly,' what could be more obvious than that no such query was permissible on the figures recorded for the first five years of the University's existence, when the different departments could not be supposed to be equally advanced in organization or to have begun work under equal conditions? What justice could there be, for example, in comparing the 3 in Greek with the 0 in Latin? Would 'a student of science' need to be told that no inference could be drawn from the bare numbers 3 and 0 in this case as to the standards of work upheld by the two departments? And what more senseless than to ask if the 0 indicates 'a less demand for teachers' or 'a less exacting preparation?'

It so happens that zoology has conferred eleven doctorates (the report of twelve is incorrect), nearly double the number in any other department. We are not ashamed of any of them, nor afraid of any just comparison. And while we take due pride in every one of them, it would be nothing less than contemptible to disparage any other department with a smaller record. There is reason for our larger number, but very remote from the suggestion so gratuitously offered by the reporter for SCIENCE. When we came to Chicago we brought with us five candidates for the Ph.D in zoology, some of whom had already spent three years on their research work while in Clark University. Our number for the five years in Chicago is thus to be considerably reduced for comparison with that of any other department. Other circumstances, which we need not here explain, would readily account for whatever differences remain.

If enough has not been said to show the absurdity of the comparison made in SCIENCE, and the injustice of disparaging comments based upon obviously insufficient data, then there is but one thing for this 'student of science' to do, and that is, to drop his study of science for the more humble occupation of learning some of the elements of common sense.

C. O. WHITMAN.

UNIVERSITY OF CHICAGO,
January 8, 1898.

[PROFESSOR WHITMAN rebukes the writer of the note in SCIENCE for lack of common sense by precept, but not by example. The sentence

complained of is as follows: "The student of science may fairly ask whether, when twelve doctorates are conferred in zoology and but three in Latin and Greek combined, this means that there is less demand for teachers of the classics or that a less exacting preparation is required." It seems difficult to interpret this in any other way than to the effect that if fewer doctorates are conferred in the classics than in the sciences then it follows that there are fewer adequately prepared teachers of the classics than of the sciences. We should not like to publish an unsigned note disparaging the classics—least of all the admirable instruction given in the classical languages at the University of Chicago—but it is proper for a scientific journal to call attention to the fact that more well-trained teachers and students have been sent out from the University of Chicago in zoology than in any other subject.—Ed. Science.]

INFORMATION DESIRED.

I shall be greatly indebted to any reader of Science who will inform me of the whereabouts of a partial cranium of *Bison antiquus*, figured in the *Kansas University Quarterly* for July, 1897, and stated to be 'in a high school in Illinois.'

F. A. Lucas.

Washington, D. C.

SCIENTIFIC LITERATURE.

A Text-Book of General Lichenology, with descriptions and figures of the genera occurring in the northeastern United States. By Albert Schneider, M.S., M.D., Fellow in Botany, Columbia University, 1894–1896. Binghamton, N. Y., Willard N. Clute & Company. 1897. 8vo. Pp. xvii+230. Pl. 76.

It is now several months since this important work first appeared, and doubtless many American botanists are already familiar with its contents. The author intended it primarily as a text-book for the use of students in colleges and universities, and it is not too much to say that, with all its faults, it is the only modern work of its kind in the English language. The first chapter is devoted to the history of lichenology, in which seven periods are recognized, viz.: I. Theophrastus (circa 300 B. C.) to Tournefort (A. D. 1694). II. Tournefort to Micheli (1729). III. Micheli to Weber (1779). IV. Weber to Wallroth and Meyer (1825). V. Wallroth and Meyer to Schwendener (1868). VI. Schwendener to Reinke (1894). VII. Reinke to the close of 1896. This historical summary will be of interest to students, especially those who do not have access to the older works, which are conveniently cited in numerous footnotes. In this historical treatment the author has quite needlessly separated the last three years, a procedure due to his adherence to Reinke's somewhat confusing views as to the nature of lichens.

The second chapter deals with the subject of Symbiosis, including (*a*) antagonistic and (*b*) mutualistic symbiosis, the latter only, according to our author, occurring in lichens. This view, again, is inspired by Reinke.

The third, fourth and fifth chapters are devoted to the structure, growth and reproduction of lichens. To our mind this is the best part of the book, and the student who goes over these chapters carefully, while studying the plants themselves in the laboratory, will obtain a very good idea of the subject they treat, especially if, at the same time, he makes use of the text and plates of Part II., dealing with classification and special morphology. Regarding the latter it may be said that the text is far better than the plates for the purpose for which the book was prepared. The figures are almost entirely diagrammatic, in spite of the statement on page 110 that they were 'made from hand sections mounted in water (C. ocular, 1-5 objective, and camera lucida).' The student who is led to suppose that he may obtain sections like these will find himself sadly mistaken after making the attempt. As diagrams these figures will be helpful, but they should not be placed before the student as camera lucida drawings of actual sections. The text of this portion of the book possesses the merit of clear and direct statement, which is more than can be said of lichen litera-

ture in general. Whether it will prove to be full enough and sufficiently accurate to be quite helpful we are not able to say, not having as yet had the opportunity of giving it a prolonged trial in the laboratory, but a somewhat careful examination of the pages pertaining to a few of the familiar genera has impressed us favorably.

The chapter on phylogeny brings out the author's views as to the nature of lichens, views which, as stated above, are essentially those of Reinke. He holds with the Schwendenerians that the fungal symbionts of the Ascolichens are derived from the Ascomycetes, and these represent different groups of fungi, *e. g.*, Pezizaceæ, Patellariaceæ, Phacidiaceæ, Stictidaceæ, Sphæriaceæ. With Schwendener also, he refers the 'gonidia' to various algal types. By returning to the second chapter we learn that the relation between fungi and algæ is considered to be the highest form of mutualistic symbiosis, which he terms individualism. This requires "that one of the symbionts be absolutely dependent upon the mutual relationship." In lichens, our author says: "We find the nutritive interdependence so marked that a new individual is formed, which in its morphology and physiology is wholly different from any of the symbionts." Again: "From the very nature of individualism it is evident that the resulting structure is a morphological unit in the full sense of the word—that is, a lichen is neither a fungus nor an alga, but a new individual which should be given a definite position in the vegetable kingdom. It is an independent individual, because we find that on separating the symbionts the individual is destroyed, as has already been indicated." We have thus a new kind of taxonomic unit, consisting of two organisms—(*a*) that derived from fungal ancestors, and (*b*) that derived from algal ancestors. This dual thing is the lichen. Hence, lichens, being entirely unlike anything else under the sun, are to be regarded as constituting a distinct class! We have thus a nominal restoration of the Class Lichenes, for which the lichenologists have been fighting for a quarter of a century. But what a restoration! A lichen is no longer a single organism, comparable to a Fucus, a Polysiphonia or a Marchantia, but a compound of two organisms, and these admitted to be of fungal and algal origin. When it comes to this, the autonomists might as well surrender and come at once into the Schwendenerian camp.

It but remains for us to say that this book, with all its shortcomings, will be useful, and that the publishers have done well in their selection of type and paper, and have furthermore given it a substantial binding.

CHARLES E. BESSEY.
THE UNIVERSITY OF NEBRASKA.

Organic Chemistry for the Laboratory. By W. A. NOYES, PH.D. Easton, Pa., Chemical Publishing Co. 1897. 12mo. Pp. xi+257. Price, $1.50.

Two purposes have been kept in view by the author in writing a new book on organic preparations. "The first has been to furnish the beginner with sufficiently full and accurate directions, and clear, concise, theoretical explanations of processes which have been found successful in practical laboratory experience. The second object has been to furnish the more advanced student and practical worker with a guide which will aid him in the selection of processes which are likely to be successful for the preparation of compounds which he may desire to use." The book is divided into eleven chapters, in which is described the preparation of the various classes of organic compounds, namely: Acids; derivatives of acids; halogen compounds; nitro compounds; amines; hydrazo, azo, and diazo compounds, etc.; alcohols and phenols; aldehydes, ketones and their derivatives; sulphonic acids and sulphine compounds; hydrocarbons, and miscellaneous compounds. At the beginning of each chapter is a discussion of the chemical reactions involved in the different methods of preparation. This is followed by directions for the preparation of a compound illustrating each method. For example, in the first chapter twelve pages are given up to a general discussion of acids and nineteen preparations are described. In all cases the theoretical explanations and experimental details are clear and full. A particularly valuable chapter is devoted to the qualitative identification of organic compounds. The usual tests

for elements other than carbon are described, and then an account is given of the typical reactions of the classes of organic compounds (hydrocarbons, phenols, amines, etc.). By means of a melting-point or boiling-point determination, a qualitative ultimate analysis, and the application of the reactions described, a large number of compounds can be easily identified.

The descriptions of such important laboratory operations as crystallization, distillation, etc., are but meagre and are scattered throughout the book. Most of them are described in the first chapter, which treats of the preparation of acids. As the student will make scarcely more than two or three of these compounds, and probably not at the beginning of the work, he is compelled to refer to the index and search out, from the details of one or more experiments, the description of the process which he wishes to use. Filtration is discussed, for example, on pages 21, 29 and 57; crystallization on pages 27 and 54, and distillation on pages 13–15, 19, 46 and 48. The book will be particularly valuable to the advanced worker in organic chemistry on account of its logical and thorough treatment of the subject, the numerous references to the literature, and the fact that it includes the recent work of importance.

JAMES F. NORRIS.

SOCIETIES AND ACADEMIES.

THE ALABAMA INDUSTRIAL AND SCIENTIFIC SOCIETY.

THE regular winter meeting of this Society was held in the city of Birmingham, on the 21st of December, Truman H. Aldrich, President, in the chair.

W. M. Brewer, of the Committee on Statistics, reported that he had collected and had published, in the technical journals of the country, monthly during the present year, the statistics of coal, coke, iron-ore, limestone and other mineral productions of the State. By the end of the first week in January he expected to have ready for publication, in the Proceedings of the Society, the complete mineral statistics for the year 1897.

With reference to the approaching Exposition at Omaha it was the sense of the Society that the State of Alabama should be represented there by a full and well arranged exhibit of its mineral and other natural resources. Four new members were elected, and a committee, consisting of Mr. James Bowron, Mr. J. H. Fitts and Dr. Wm. B. Phillips, was appointed to represent the Society at the River and Harbor Convention, which is to be held in in the city of Tuscalloosa on the 29th of December. To this committee the President of the Society was added.

M. Henri Cardoza, a Commissioner of the French Government to investigate the labor conditions of this country, was presented to the Society by Dr. Phillips, and made some remarks explanatory of his mission.

Mr. Mason H. Sherman then read a paper, prepared by Wm. Blauvelt, on 'The Semet-Solvay Coke Oven and its Products.' This paper gave a very full account of the retort oven plant which is now in course of construction at Ensley, near Birmingham, and which is the sixth installation of by-product ovens in this country. The coke, tar, ammonia, gas and other by-products of these ovens were treated in detail by Mr. Blauvelt. As usual, this subject gave rise to an animated discussion, in which Dr. Phillips, Mr. Aldrich and others took part. Inasmuch as recovery-ovens and by-product plants have occupied a very prominent place in the papers read before this Society and in the discussions thereon during the past six years, it is believed that the installation of the plant at Ensley is the direct outcome of the persistent efforts of this Society to put a stop to the appalling waste incident to the use of the old bee-hive ovens.

Dr. Phillips then read a paper on 'Some of the Results of Washing the Alabama Coals for Coking,' in which he presented a number of tests carried out by him upon the cokes from the different coals mined near Birmingham, and coked under different conditions. This paper is from advance sheets of a new edition of 'Iron Making in Alabama,' by Dr. Phillips, soon to be published as a Bulletin of the Geological Survey.

President Aldrich then spoke of the great quantity of low-grade, free-milling gold ores

occurring in the eastern part of the State, and suggested that they offer a promising field to our mining engineers for experiments in concentrating on a large scale so as to avoid the necessity of running so much barren material through the mills.

The Society then adjourned to meet again in February.

EUGENE A. SMITH,
Secretary.

THE 269TH MEETING OF THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON, TUESDAY, DECEMBER 21.

MR. GEO. R. STETSON, in his paper upon 'The Climacteric of the Negro Problem,' discussed the causes which have brought about the estrangement of the races; contending that race discrimination upon the part of the whites is frequently justified by necessity; a practice of which the negro cannot justly complain, as in every instance where he has obtained governmental control—in the West Indies, in Liberia and elsewhere—white citizenship is absolutely proscribed.

The progress in the economic condition of the negro is without intention sentimentally exaggerated; while numbering 12 per cent. of the population, the value of his taxable property is but 0.39 of one per cent. of our total wealth. The negro does not suffer from the lack of opportunity, but for want of the means and knowledge to make the opportunity his own. While his criminal record is bad, if we take into consideration his opportunities and moral status, our own record of degeneracy is worse, and the White Problem is quite as serious as the Negro Problem.

Mr. Stetson attributed the present climacteric to the default on our part, and especially of those more closely associated with him, in ignoring the ethical relations of the two races and neglecting personal interest in the negro's moral, industrial and general training. "Our chief and fatal error lies in not practically reorganizing in our educational systems his peculiar racial needs and differences;" an error which has been fatal to his social progress, and highly inimical and dangerous to the collective interests of both races.

The primary and greatest need of the negro and forty-one per cent. of our white population is practical instruction in agriculture in the elementary school, a system already revived in France, Germany, Russia and Ireland.

The abandonment of secondary education at the public expense was advocated upon the ground of its inaccessibility to the great majority of both races, and especially to the negro, the effect of such education upon races of inferior development and upon inferior classes of the higher races being to create a prejudice against manual labor. Incidentally, Mr. Stetson advocated positive religious instruction in the elementary school, and the establishment of the kindergarten as a necessary reënforcement of our school systems in the presence of an environment seething with the most virulent moral pest germs.

Mr. O. F. Cook, professor of natural science in Liberia College, Monrovia, read a paper on 'Traits of Native African Character,' in which he described the negro as he exists to-day in this negro republic, and gave the difference in character between them and those of the United States. His remarks showed a close and true study of these people, and how they had succeeded, notwithstanding the current belief in this country to the contrary. In Liberia and among the native population generally they respected the judgment and ability of the white man.

J. H. MCCORMICK,
General Secretary.

GEOLOGICAL SOCIETY OF WASHINGTON.

AT the meeting of December 22, 1897, Mr. W. Lingdren, of the United States Geological Survey, read a paper on 'The Canyons of the Salmon and Snake Rivers, Idaho.' The little known region between Idaho and Oregon where the Snake River and its mighty tributary, the Salmon, join is one of exceptional interest. In this vicinity lies the eastern margin of the great Columbia lava-fields, the shore line, so to speak, where the moulten flows were arrested by the mountain ranges of Idaho. Near Weiser, Snake River leaves the broad open valley occupying such a large part of southern Idaho, turns northward and flows across the great lava

masses in a canyon which in grandeur is only second to the Canyon of the Colorado. It is an abrupt trench cut to a depth of over 5,000 feet in the basaltic plateau. The deepest and most impressive part lies in the vicinity of the Seven Devils, a group of peaks rising to elevations exceeding 9,000 feet on the eastern side of the river. From the summits of these there is a sharp and continuous slope of 8,000 feet down to the level of the river. The exposures along the canyons are magnificent, showing from 1,000 to 4,000 feet of horizontal lavas covering a series of older slates and greenstones.

The Salmon River Canyon, for a long distance above its junction with the Snake, is between 4,000 and 5,000 feet deep. Except in its lowest portion, it is cut in the rocks of the older series. Granitic rocks, forming a large part of the great Idaho granite area, occupy a large space in Idaho adjacent to the Columbia lava. Instead of being of Archean age, as has been hitherto supposed, the granite is probably post-Carboniferous, as shown by the contact metamorphism of the Paleozonic series adjoining on the north.

This series of slates, limestone, schist and greenstones present the greatest similarity to the Auriferous slates of the Sierra Nevada. Round Crinoid stems were found in one of the limestone lenses. Excellent exposures are found in the lower Salmon River Canyon and along the Snake River. The Columbia lava flows are of Miocene age. They consist nearly exclusively of massive basalt, and are piled up one on another in seemingly endless succession. Slight differences of structure make the individual flows conspicuous and from a distance the exposures along the canyon side appear like those of a sedimentary series. The lava flows were poured out over an exceedingly uneven surface of deep valleys and precipitous mountain ranges. The latter tower far above the summit of the lava plateau, while the bottom of the former lie below the level of the river. Coupling this evidence with the fact that the sediments in the lower Snake River Valley, above Weiser, are of great depth, their bottom probably not being far from sea level, it appears that this whole area has suffered a depression since pre-volcanic times. The great outpouring of the Columbia lava evidently dammed a gap between the two high pre-volcanic ranges, the Blue Mountains of Oregon on the west and the Salmon River Ranges on the east. This barrier produced a great lake, the Miocene and Pliocene sediments of which now fill the upper Snake River Valley. The inland sea overflowed its barrier, established an outlet and the mighty volume of water has worn a canyon which eventually drained the lake.

At this meeting the Society elected officers for the ensuing year. These are: President, Arnold Hague: Vice-Presidents, Joseph S. Diller and Whitman Cross; Treasurer, M. R. Campbell; Secretaries, C. Willard Hayes and T. W. Stanton; Members-at-Large of Council, S. F. Emmons, George P. Merrill, W. H. Weed, David White and Bailey Willis.

W. F. Morsell.

U. S. Geological Survey.

NEW BOOKS.

The Smithsonian Institution, 1846–1896. The History of its first half century. Edited by George Brown Goode. City of Washington. 1896. Pp. 856.

Audubon and his Journals. Maria Audubon. With zoological and other notes by Elliott Coues. New York, Charles Scribner's Sons. 1897. Vol. I., pp. x + 532. Vol. II., viii + 535. $7.50.

Revision of the Orthopteran Group Melanopli (acridiidæ). With special reference to North American Forms. Samuel Hubbard Scudder. Washington, Government Printing Office. 1897. Pp. 421. 26 plates.

An Elementary Course of Infinitesimal Calculus. Horace Lamb. Cambridge, The University Press; New York, The Macmillan Company. 1897. Pp. xx + 616. $3.00.

Theoretical Mechanics. A. E. H. Love. Cambridge, The University Press; New York, The Macmillan Company. 1897. Pp. xiv + 370. $3.00.

Lessons With Plants. L. H. Bailey. New York and London; The Macmillan Company. 1898. Pp. xxxi + 491. $1.10.